

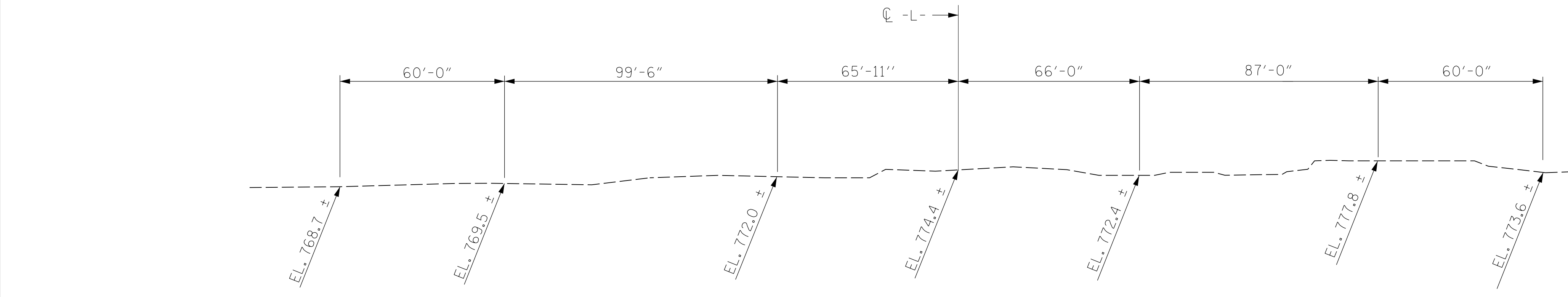
LOCATION SKETCH

FOUNDATION NOTES

1. THE REINFORCED CONCRETE BOX CULVERT SHALL BE PLACED ON THE STANDARD 1.0 FOOT BLANKET OF FOUNDATION CONDITIONING MATERIAL SEE SECTION 414 OF THE STANDARD SPECIFICATIONS.
2. CONSTRUCT THE REINFORCED CONCRETE BOX CULVERT WITH 4 INCHES OF CAMBER TO ACCOUNT FOR ANTICIPATED SETTLEMENT.

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE	
BARREL @ 1.65 CY/FT	524.7 C.Y.
WING ETC.	26.6 C.Y.
TOTAL	551.3 C.Y.
REINFORCING STEEL	
BARREL	65,834 LBS.
WINGS ETC.	1,547 LBS.
TOTAL	67,381 LBS.
FOUNDATION COND. MAT'L.	318 TONS
CULVERT EXCAVATION	LUMP SUM



DRAWN BY: H.ASSFOURA DATE: 11/16
 CHECKED BY: D. RUGGLES DATE: 11/16
 DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 11/16

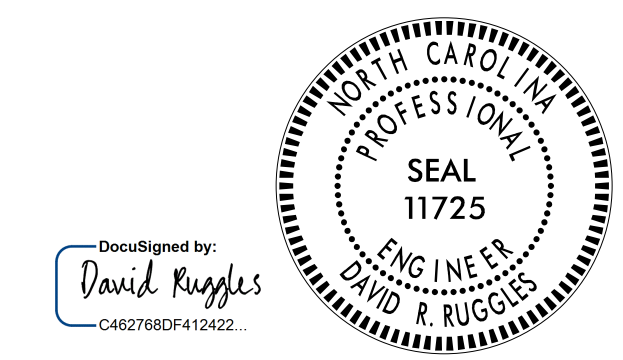
PROFILE ALONG C OF CULVERT

NOTES:

1. ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
2. DESIGN FILL IS 46.0 FEET.
3. TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FEET. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.
4. THERE ARE 49 "C" BARS IN SECTION OF BARREL.
5. THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.
6. FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
7. A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
8. NATIVE MATERIAL PLACED BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL BETWEEN THE LOWER SILLS. THE NATIVE MATERIAL SHALL BE MATERIAL THAT IS EXCAVATED FROM THE STREAM BED AT THE PROJECT SITE DURING CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.
9. NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.
10. FOR OTHER DESIGN DATA & NOTES SEE STANDARD NOTE SHEET.
11. 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
12. CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:
 1. WING FOOTINGS, CURTAIN WALLS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
 2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS
13. THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.
14. DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.
15. AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
16. FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
17. FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
18. FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
19. FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

PROJECT NO. R-2707C
CLEVELAND COUNTY
 STATION: 453+07.00 -L-

SHEET 1 OF 5



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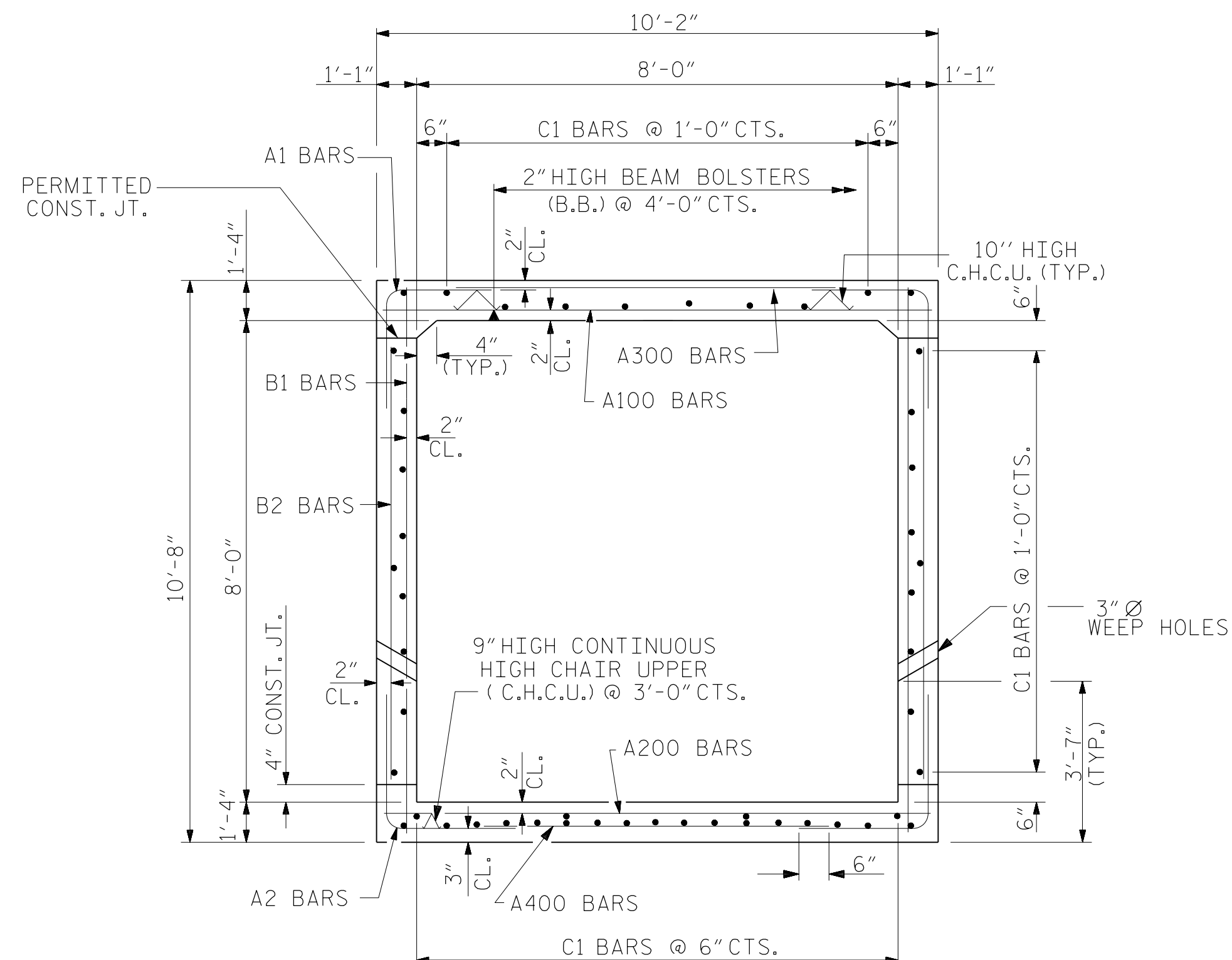
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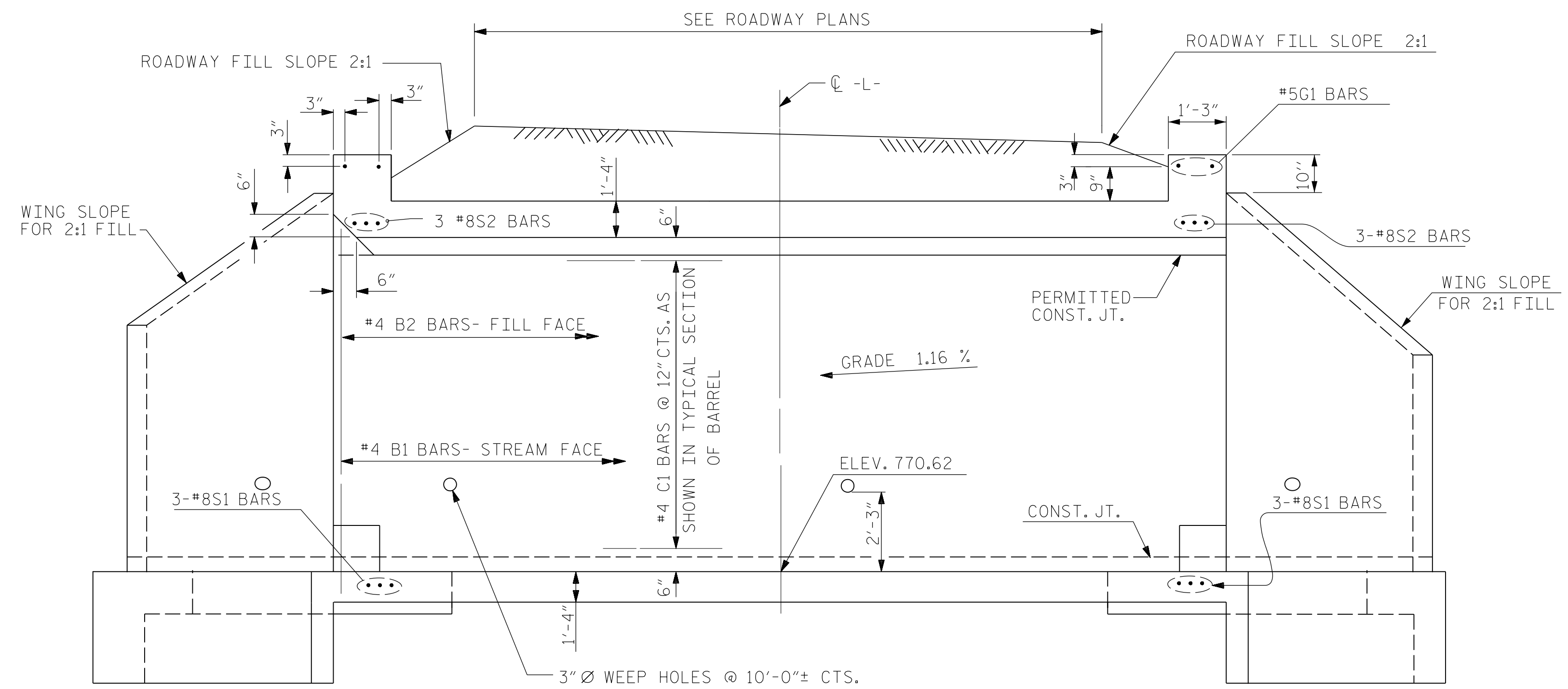
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SINGLE 8 FT. X 8 FT.
 CONCRETE BOX CULVERT
 70°SKEW

REVISIONS				SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
TOTAL SHEETS					5
					C12-01

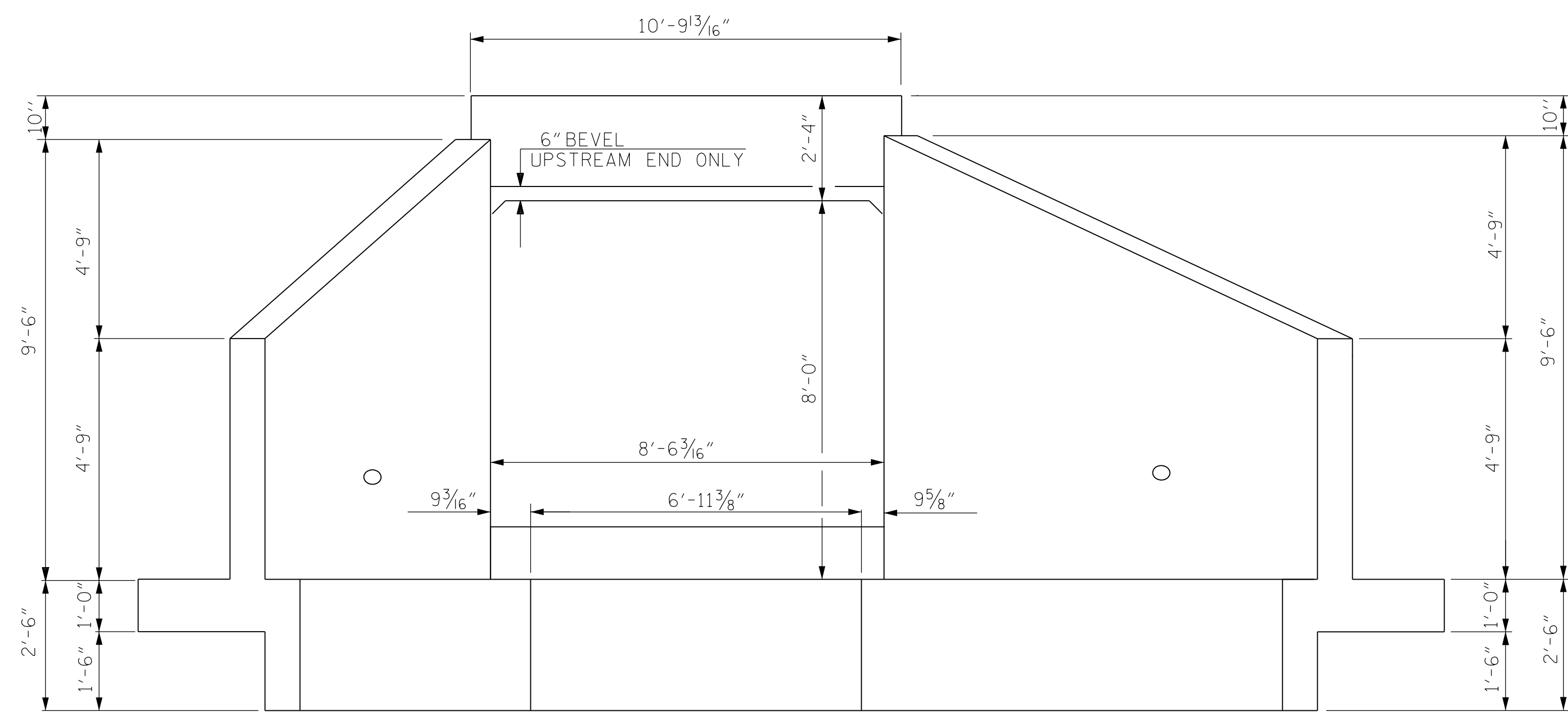
R 2707C-SITE 3
 2/10/2017
 \\12-001-R2707C-SMU-LS01-C12-1.dgn
 USER:deFault



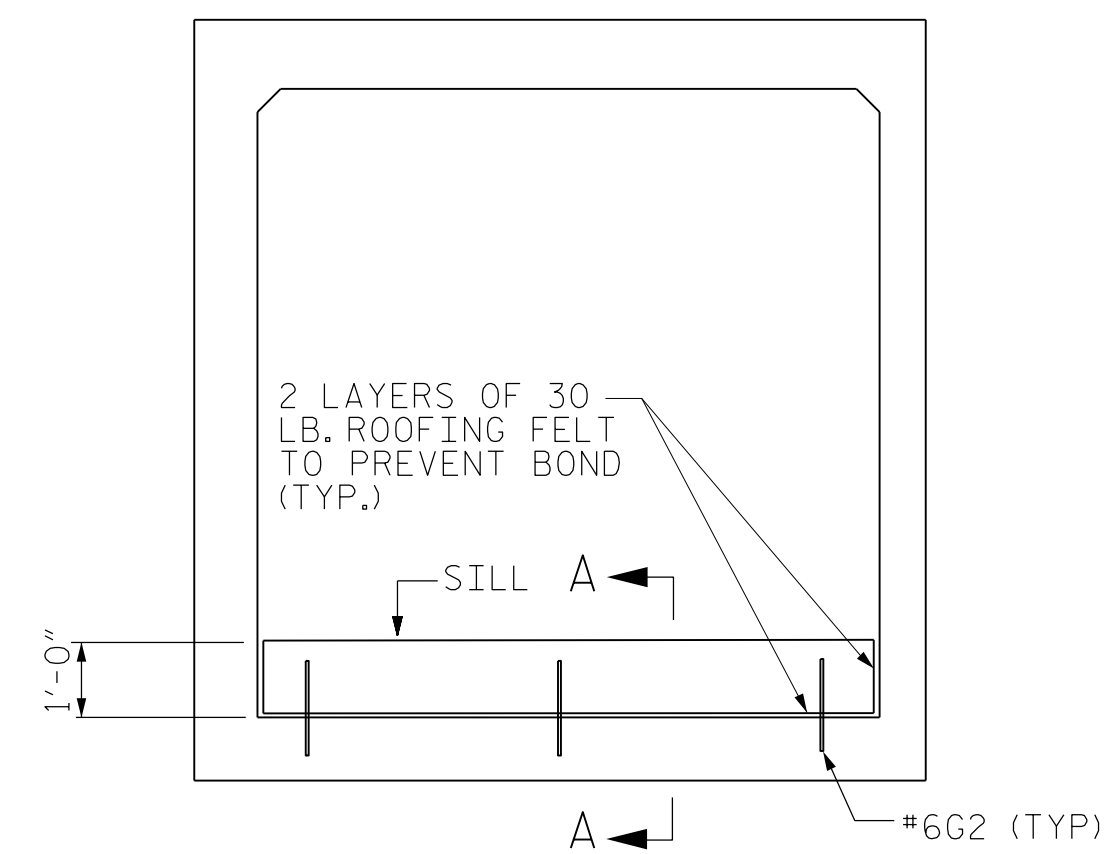
RIGHT ANGLE SECTION OF BARREL
THERE ARE 49 "C" BARS IN SECTION OF BARREL



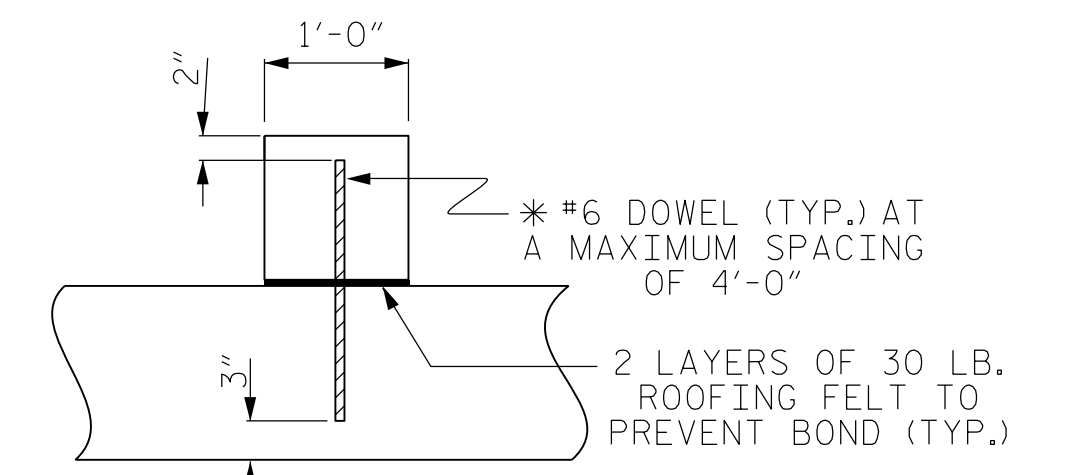
CULVERT SECTION NORMAL TO ROADWAY



END ELEVATION NORMAL TO SKEW



SILL DETAIL
(SILLS AT INLET & OUTLET)



SECTION A-A

* DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.

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CLEVELAND COUNTY
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SHEET 2 OF 5



2/10/2017

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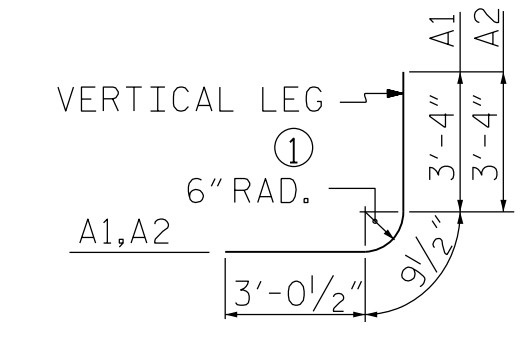
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SINGLE 8 FT. X 8 FT.
CONCRETE BOX CULVERT
70° SKEW

REVISIONS						SHEET NO. C12-02
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 5
2			4			

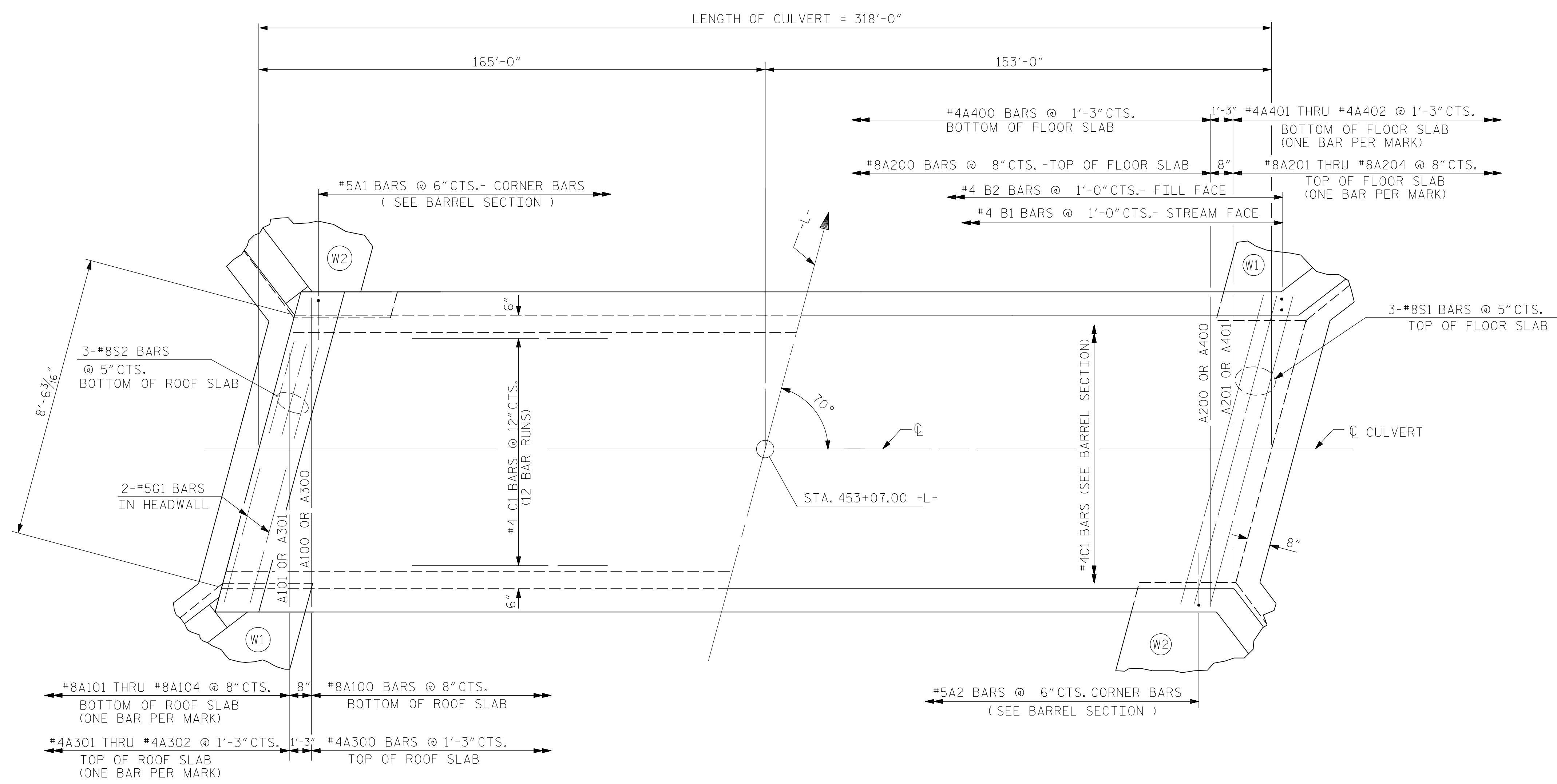
DRAWN BY: H.ASSFOURA DATE: 11/16
CHECKED BY: D. RUGGLES DATE: 11/16
DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 11/16

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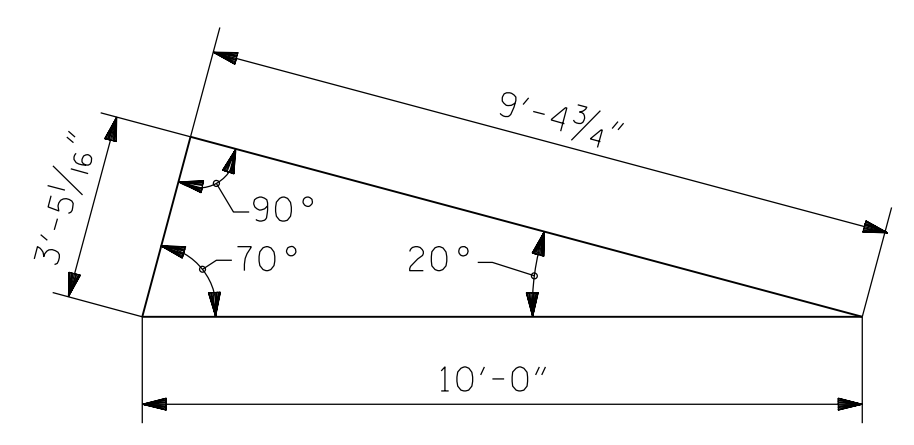
BAR TYPE		BILL OF MATERIAL				
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
A1	1272	#5	1	7'-2"	9508	
A2	1272	#5	1	7'-2"	9508	
A100	472	#8	STR.	9'-9"	12288	
A101	2	#8	STR.	7'-11"	42	
A102	2	#8	STR.	6'-1"	32	
A103	2	#8	STR.	4'-3"	23	
A104	2	#8	STR.	2'-5"	13	
A200	472	#8	STR.	9'-9"	12288	
A201	2	#8	STR.	7'-11"	42	
A202	2	#8	STR.	6'-1"	32	
A203	2	#8	STR.	4'-3"	23	
A204	2	#8	STR.	2'-5"	13	
A300	252	#4	STR.	9'-9"	1641	
A301	2	#4	STR.	6'-3"	8	
A302	2	#4	STR.	2'-10"	4	
A400	252	#4	STR.	9'-9"	1641	
A401	2	#4	STR.	6'-3"	8	
A402	2	#4	STR.	2'-10"	4	
B1	636	#4	STR.	10'-0"	4248	
B2	636	#4	STR.	6'-11"	2939	
C1	588	#4	STR.	28'-4"	11132	
S1	6	#8	STR.	10'-5"	168	
S2	6	#8	STR.	10'-5"	168	
G1	4	#5	STR.	10'-5"	44	
G2	6	#6	STR.	1'-11"	17	
REINFORCING STEEL					65,834 LBS	



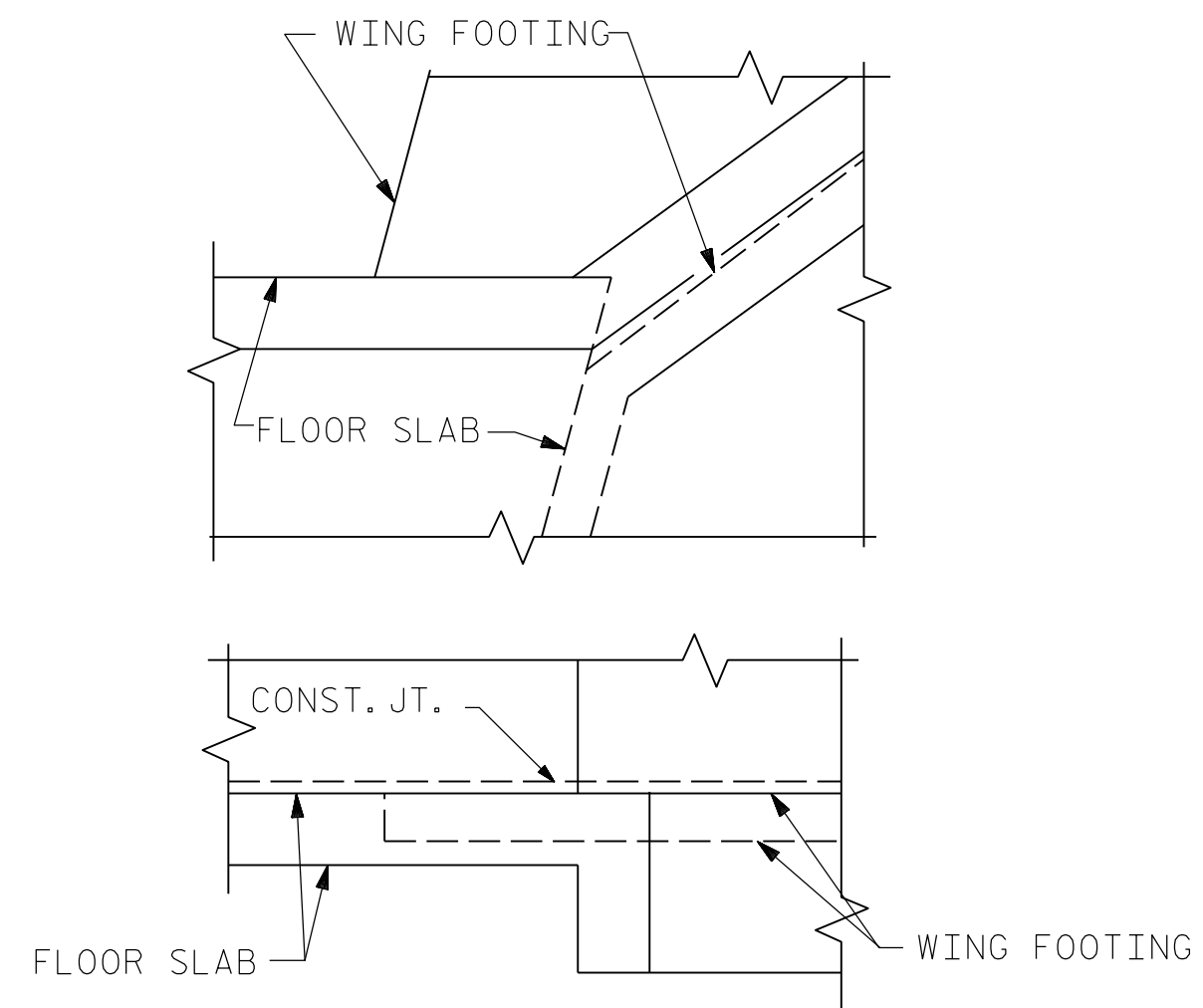
DIMENSIONS ARE OUT TO OUT



PART PLAN - ROOF SLAB PART PLAN - FLOOR SLAB



SKIEW TRIANGLE



DETAIL
CONNECTION OF WING FOOTING
AND FLOOR SLAB WHEN SLAB
IS THICKER THAN FOOTING

SPLICE CHART		
BAR	SIZE	SPLICE LENGTH
B1	#4	1'-9"
C1	#4	1'-11"

PROJECT NO. R-2707C
CLEVELAND COUNTY
 STATION: 453+07.00 -L-

SHEET 3 OF 5



2/10/2017

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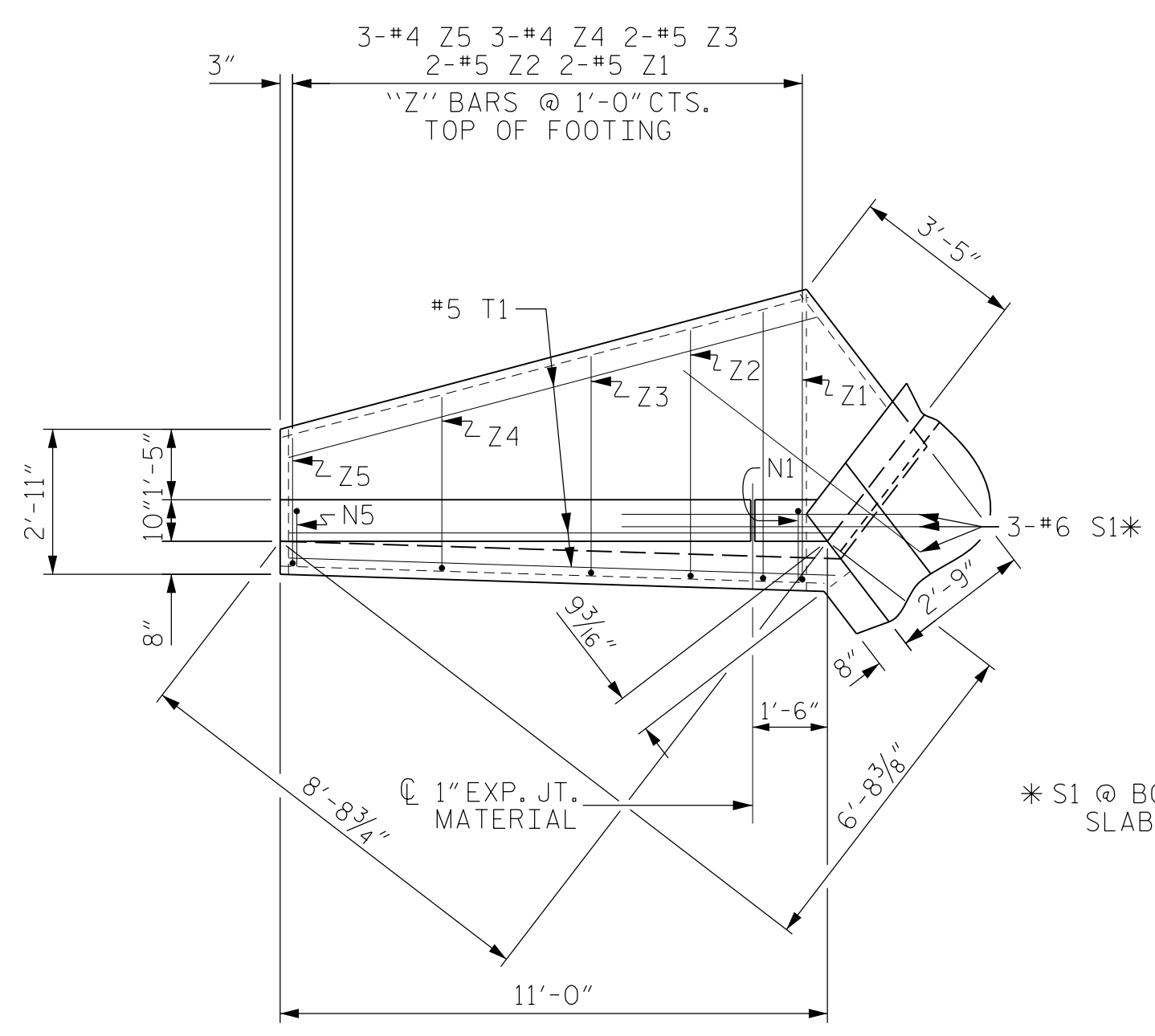
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SINGLE 8 FT. X 8 FT. CONCRETE BOX CULVERT 70°SKEW					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

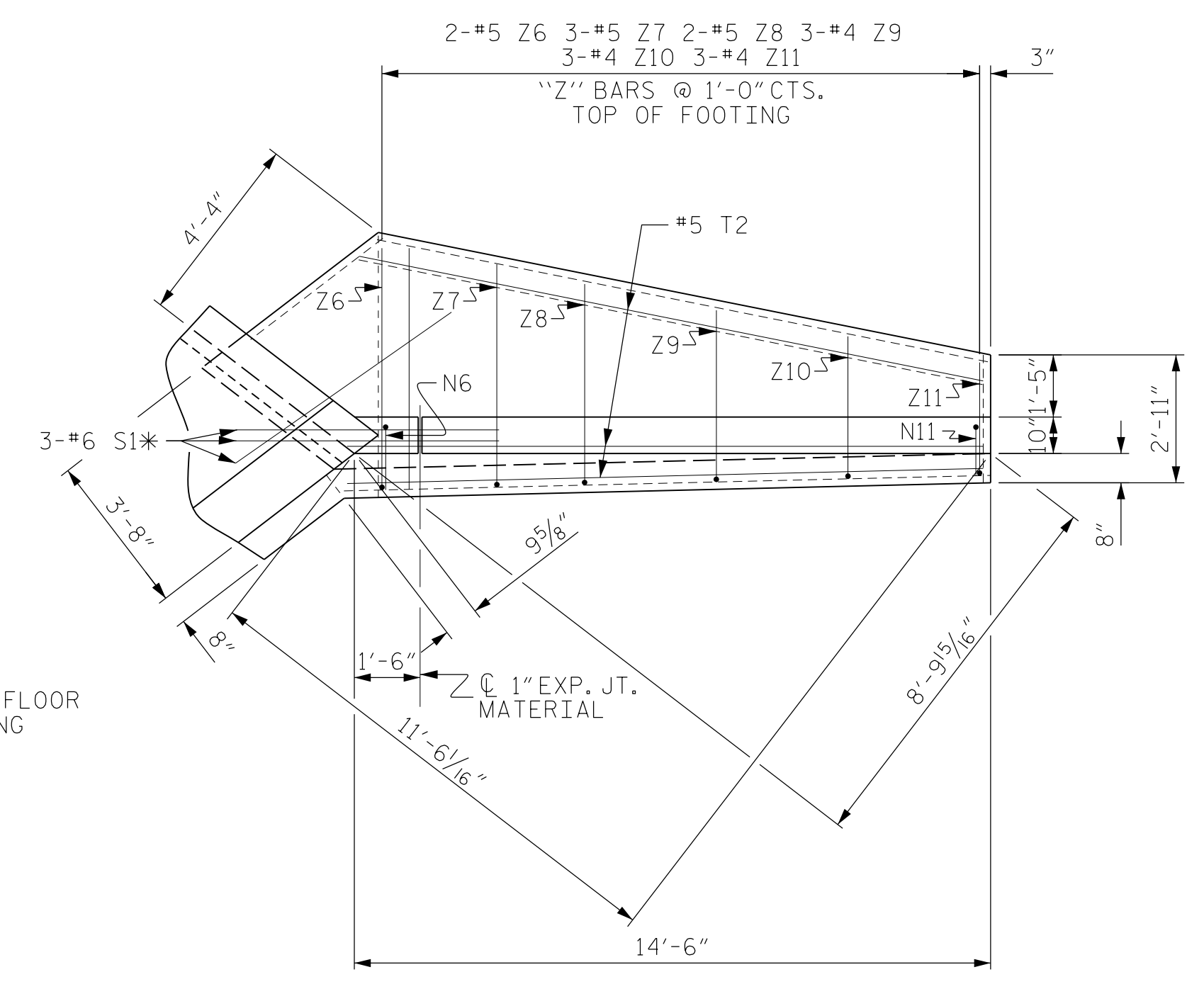
SHEET NO. **C12-03**
 TOTAL SHEETS **5**

DRAWN BY: <u>H.ASSFOURA</u>	DATE: <u>11/16</u>
CHECKED BY: <u>D. RUGGLES</u>	DATE: <u>11/16</u>
DESIGN ENGINEER OF RECORD: <u>D. RUGGLES</u>	DATE: <u>11/16</u>

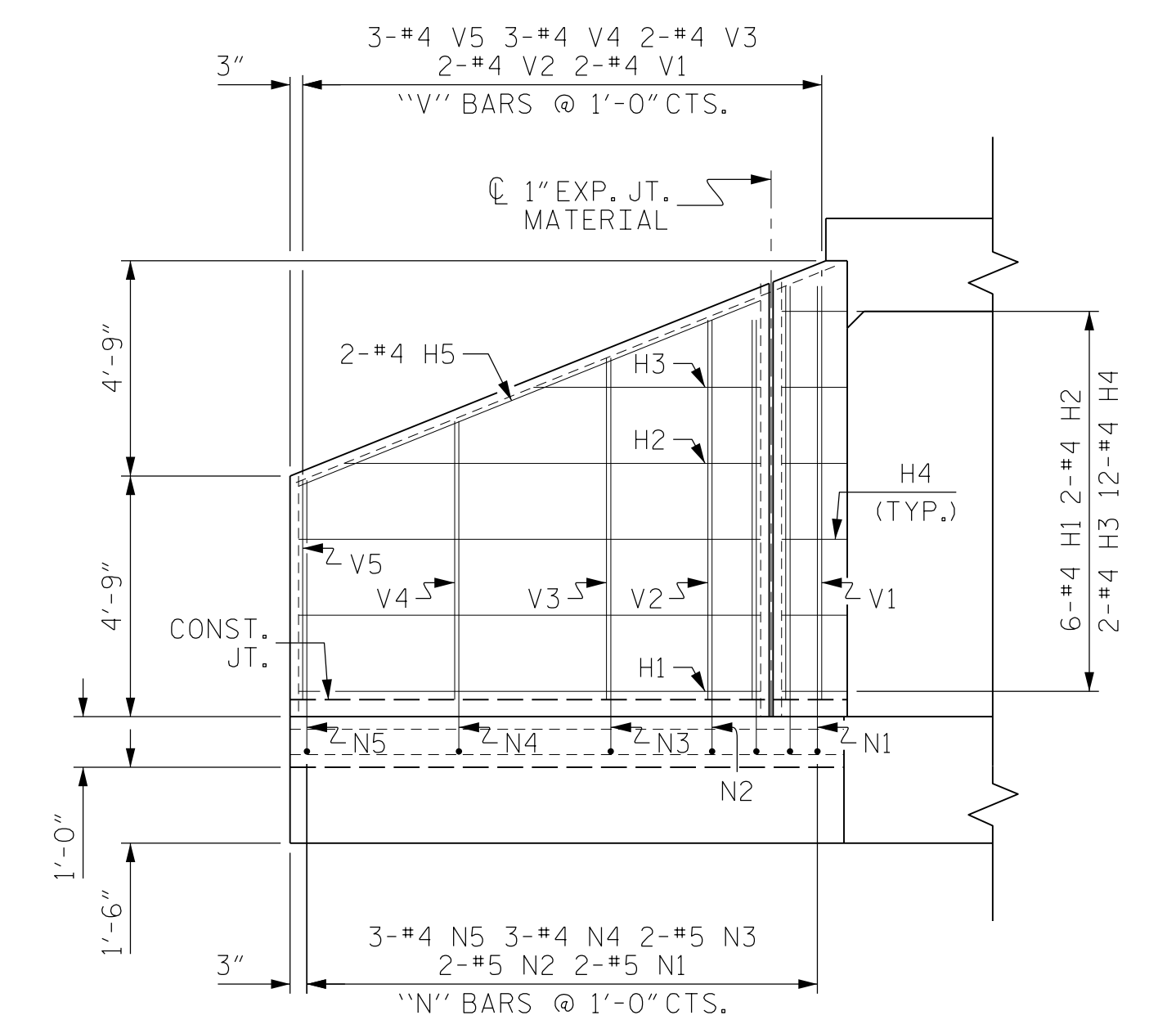
R 2707C-SITE 3
 2/10/2017
 \\412-005.R2707C-SMU-SP03-C12-3.dgn
 USER:deFault



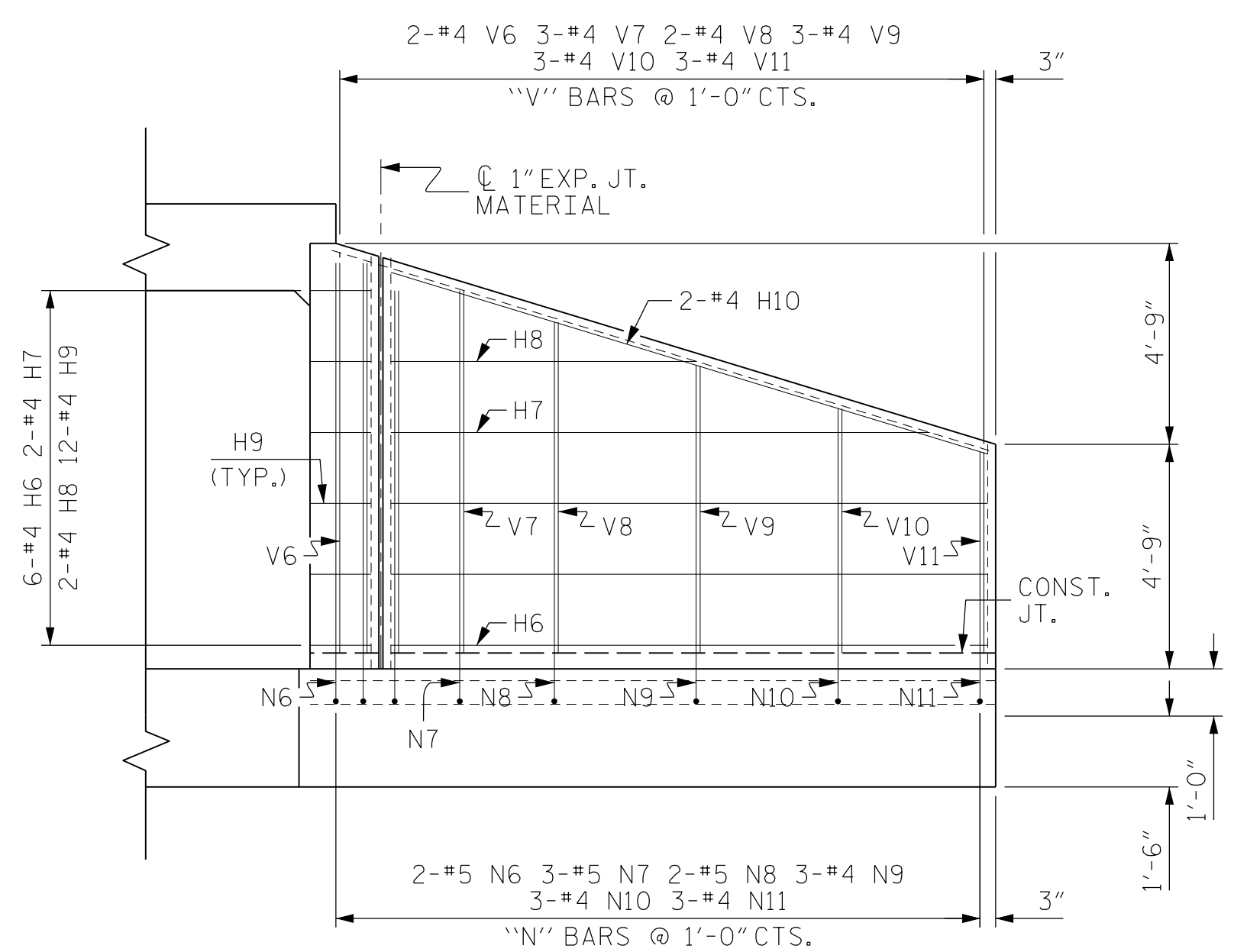
PLAN W2



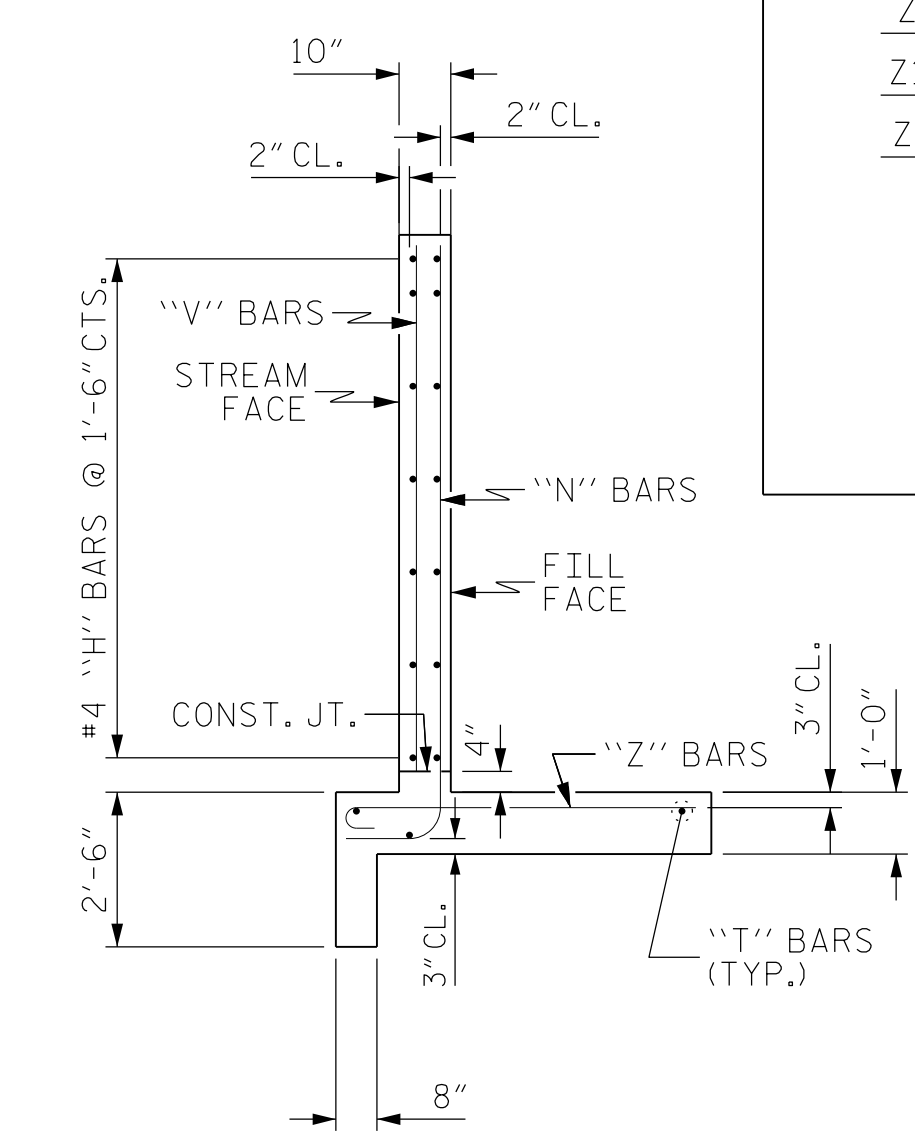
PLAN W1



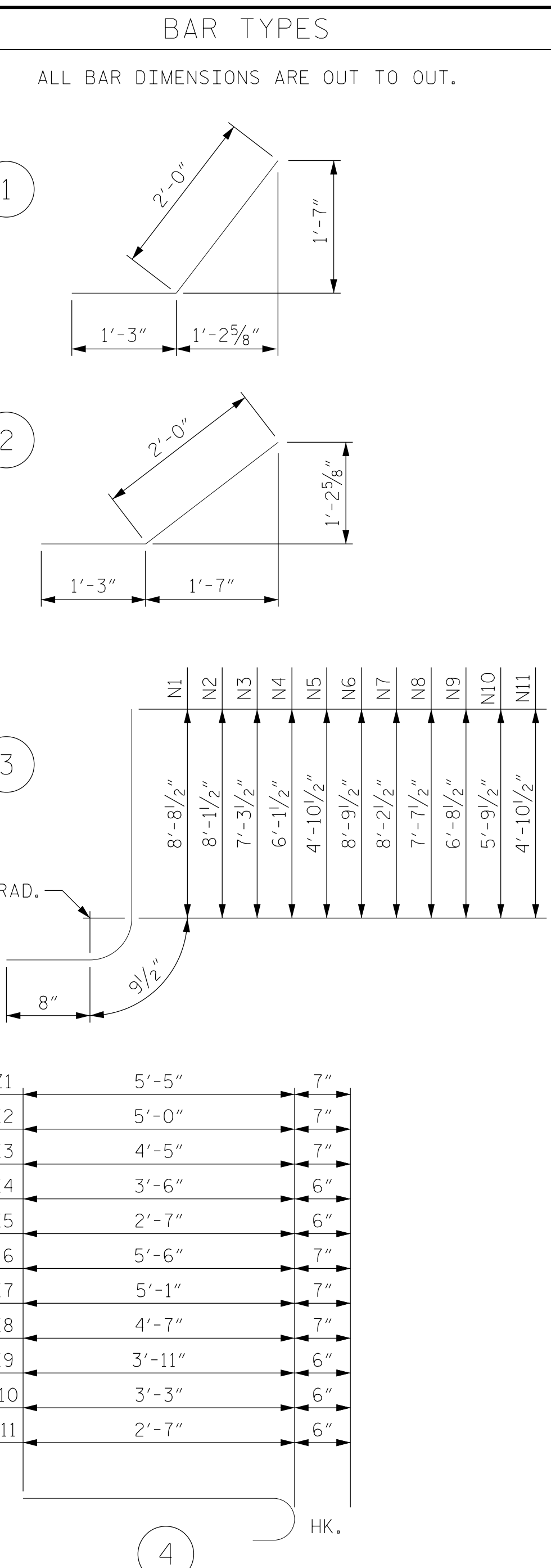
ELEVATION W2



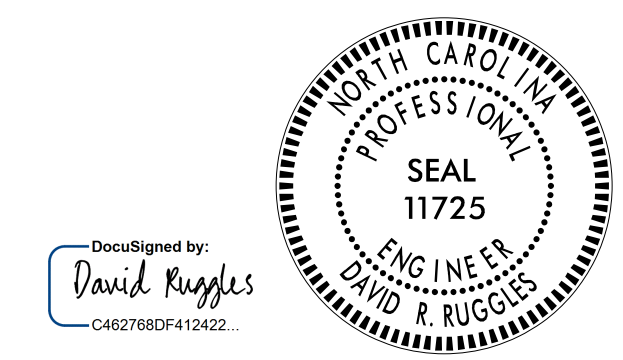
ELEVATION W1



TYPICAL WING SECTION



BILL OF MATERIAL					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	9'-1"	73
H2	4	#4	STR	8'-2"	22
H3	4	#4	STR	4'-5"	12
H4	24	#4	1	3'-3"	52
H5	4	#4	STR	9'-10"	26
H6	12	#4	STR	12'-7"	101
H7	4	#4	STR	11'-4"	30
H8	4	#4	STR	6'-5"	17
H9	24	#4	2	3'-3"	52
H10	4	#4	STR	13'-2"	35
N1	4	#5	3	10'-2"	42
N2	4	#5	3	9'-7"	40
N3	4	#5	3	8'-9"	37
N4	6	#4	3	7'-7"	30
N5	6	#4	3	6'-4"	25
N6	4	#5	3	10'-3"	43
N7	6	#5	3	9'-8"	60
N8	4	#5	3	9'-1"	38
N9	6	#4	3	8'-2"	33
N10	6	#4	3	7'-3"	29
N11	6	#4	3	6'-4"	25
S1	12	#6	STR	6'-0"	108
T1	6	#5	STR	11'-0"	69
T2	6	#5	STR	14'-6"	91
V1	4	#4	STR	8'-2"	22
V2	4	#4	STR	7'-6"	20
V3	4	#4	STR	6'-9"	18
V4	6	#4	STR	5'-6"	22
V5	6	#4	STR	4'-4"	17
V6	4	#4	STR	8'-3"	22
V7	6	#4	STR	7'-8"	31
V8	4	#4	STR	7'-0"	19
V9	6	#4	STR	6'-1"	24
V10	6	#4	STR	5'-2"	21
V11	6	#4	STR	4'-3"	17
Z1	4	#5	4	6'-0"	25
Z2	4	#5	4	5'-7"	23
Z3	4	#5	4	5'-0"	21
Z4	6	#4	4	4'-0"	16
Z5	6	#4	4	3'-1"	12
Z6	4	#5	4	6'-1"	25
Z7	6	#5	4	5'-8"	35
Z8	4	#5	4	5'-2"	22
Z9	6	#4	4	4'-5"	18
Z10	6	#4	4	3'-9"	15
Z11	6	#4	4	3'-1"	12
REINFORCING STEEL FOR 4 WINGS					1547 LBS
CLASS A CONCRETE					
4 WINGS					22.6 CY
2 HEADWALLS					1.0 CY
2 END CURTAIN WALLS					2.4 CY
2 SILLS					0.6 CY
TOTAL					26.6 CY



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PROJECT NO. R-2707C
 CLEVELAND COUNTY
 STATION: 453+07.00 -L-
 SHEET 4 OF 5

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD WINGS
 FOR
 CONCRETE BOX CULVERT
 H = 8'-0" SLOPE = 2:1
 75° SKEW

REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

DRAWN BY: H.ASSFOURA DATE: 11/16
 CHECKED BY: D. RUGGLES DATE: 11/16
 DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 11/16

R 2707C-SITE 3
 2/10/2017
 \\412-007-R2707C-SMU-WW04-C12-4.dgn
 USER: dcfault

LOAD AND RESISTANCE FACTOR RATING (LRFR)
SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER	
						LIVE-LOAD FACTORS (γ _{LL})	MOMENT				SHEAR				
							RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE		DISTANCE FROM LEFT END OF ELEMENT (ft)
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A		N/A	N/A	1.75	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
	HL-93 (OPERATING)	N/A		N/A	N/A	1.35	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
	HS-20 (INVENTORY)	36.000		N/A	N/A	1.75	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
	HS-20 (OPERATING)	36.000		N/A	N/A	1.35	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
		SNGARBS2	20.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
		SNAGRIS2	22.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
		SNCOTTS3	27.250		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
		SNAGGRS4	34.925		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
		SNS5A	35.550		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
		SNS6A	39.950		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
		SNS7B	42.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
	TRUCK TRACTOR SEMI-TRAILER (TTS)	TNAGRIT3	33.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
		TNT4A	33.075		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
		TNT6A	41.600		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
		TNT7A	42.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
		TNT7B	42.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
		TNAGRIT4	43.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
	TNAGT5A	45.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	
	TNAGT5B	45.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	
PERMANENT LOADS		N/A	#4	1.04	N/A	N/A	1.12	1	TOP SLAB	4.54	1.04	1	EXT. WALL	1.45	2

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

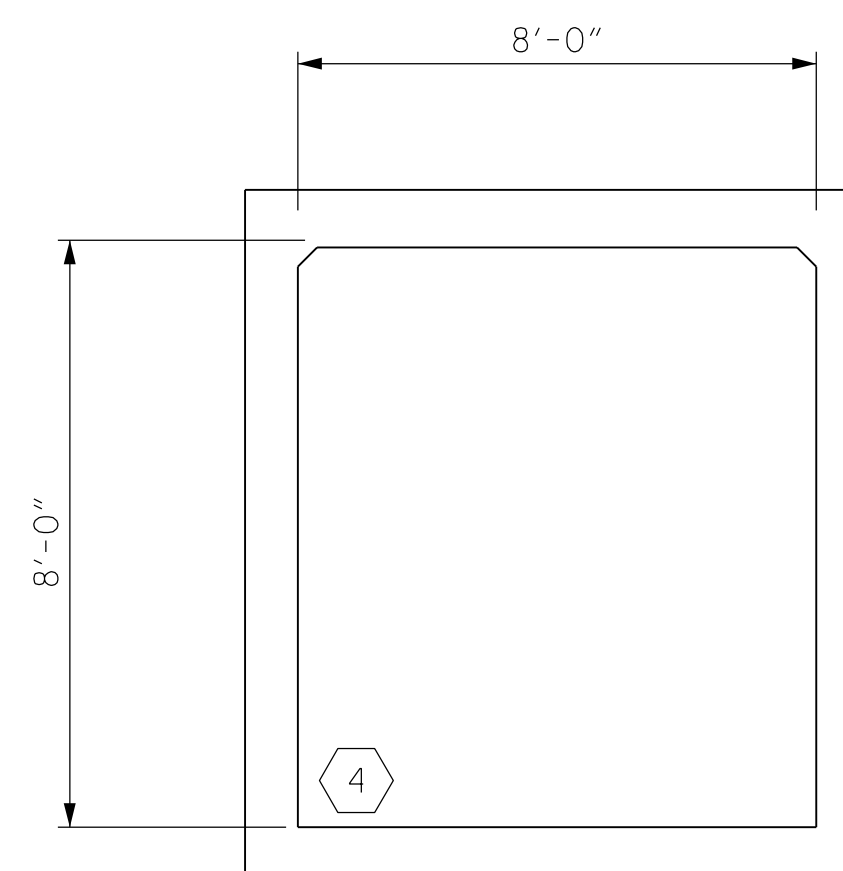
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

- EFFECTS OF LIVE LOAD MAY BE NEGLECTED ACCORDING TO AASHTO LRFD 3.6.1.2.6 (DESIGN FILL=46.0')
- CULVERTS WITH DEEP FILL SHOULD BE EVALUATED FOR THE EFFECTS OF PERMANENT LOADS ONLY ACCORDING TO "THE MANUAL FOR BRIDGE EVALUATION 6A.5.2.3A"

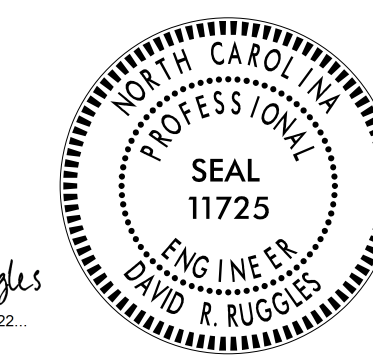
#	CONTROLLING LOAD RATING
1	DESIGN LOAD RATING (HL-93)
2	DESIGN LOAD RATING (HS-20)
3	LEGAL LOAD RATING **
4	PERMANENT LOAD RATING
** SEE CHART FOR VEHICLE TYPE	



LRFR SUMMARY
(LOOKING DOWNSTREAM)

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 453+07.00 -L-

SHEET 5 OF 5



2/10/2017

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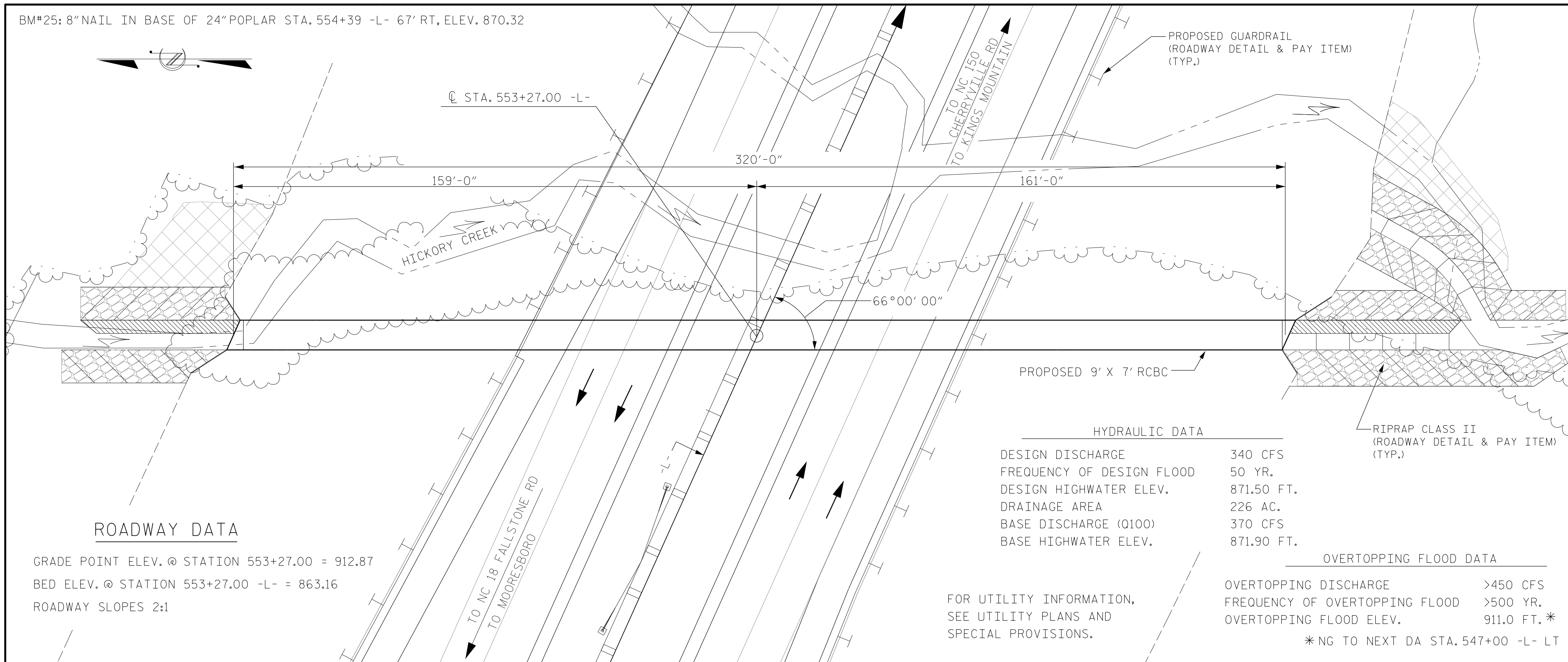
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SINGLE 8 FT. X 8 FT.
CONCRETE BOX CULVERT
70°SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C12-05
1			3			TOTAL SHEETS 5
2			4			

DRAWN BY: <u>H.ASSFOURA</u>	DATE: <u>11/16</u>
CHECKED BY: <u>D. RUGGLES</u>	DATE: <u>11/16</u>
DESIGN ENGINEER OF RECORD: <u>D. RUGGLES</u>	DATE: <u>11/16</u>

BM#25: 8" NAIL IN BASE OF 24" POPLAR STA. 554+39 -L- 67' RT, ELEV. 870.32



LOCATION SKETCH

NOTES:

- ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
- DESIGN FILL IS 42.0 FEET.
- TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FEET. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.
- THERE ARE 50 "C" BARS IN SECTION OF BARREL.
- THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.
- FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
- A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
- NATIVE MATERIAL PLACED BETWEEN SILLS/Baffles IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. THE NATIVE MATERIAL SHALL BE MATERIAL THAT IS EXCAVATED FROM THE STREAM BED AT THE PROJECT SITE DURING CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.
- NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.
- FOR OTHER DESIGN DATA & NOTES SEE STANDARD NOTE SHEET.
- 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
- CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

- WING FOOTINGS, CURTAIN WALLS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
- THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS
- THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.
- DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.
- AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

FOUNDATION NOTES:

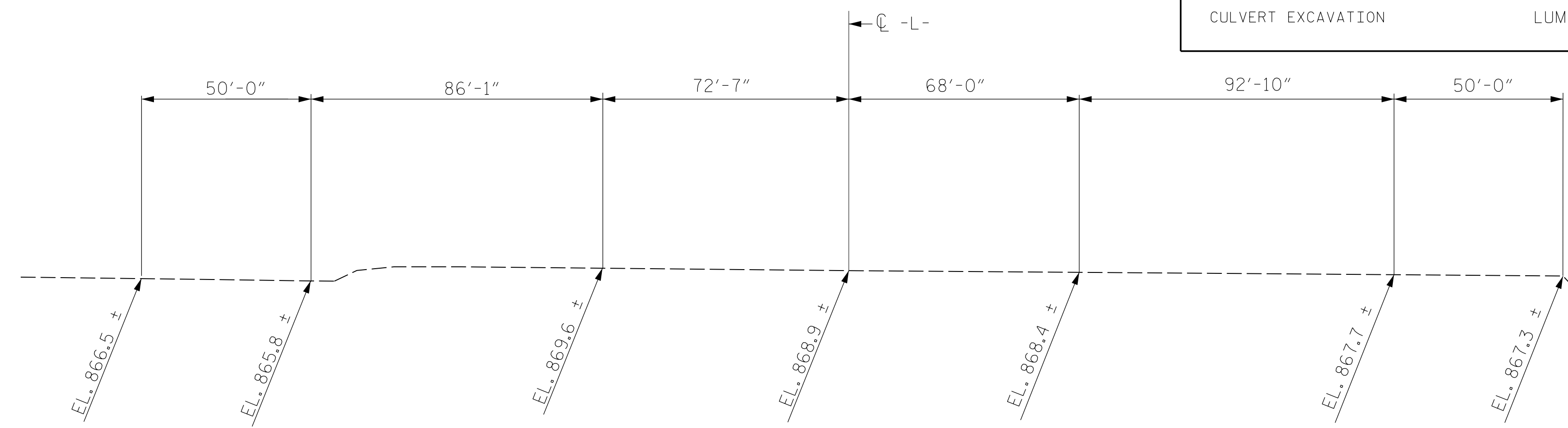
- THE REINFORCED CONCRETE BOX CULVERT SHALL BE PLACED ON THE STANDARD 1.0 FOOT BLANKET OF FOUNDATION CONDITIONING MATERIAL. SEE SECTION 414 OF STANDARD SPECIFICATIONS.
- CONSTRUCT THE REINFORCED CONCRETE BOX CULVERT WITH 10 INCHES OF CAMBER TO ACCOUNT FOR ANTICIPATED SETTLEMENT.

NOTES (CONTINUED):

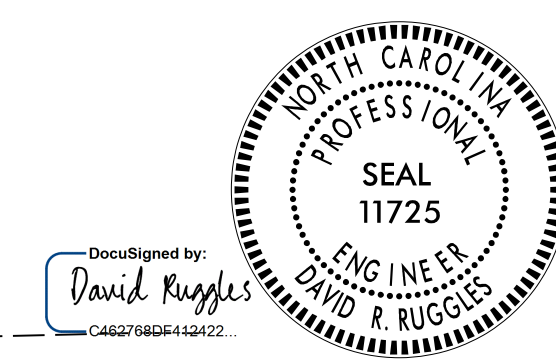
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE			
BARREL @ 1.55	CY/FT	495.8	C.Y.
WING ETC.		28.2	C.Y.
TOTAL		524.0	C.Y.
REINFORCING STEEL			
BARREL		86,107	LBS.
WINGS ETC.		1,321	LBS.
TOTAL		87,428	LBS.
FOUNDATION COND. MAT'L.		335	TONS
CULVERT EXCAVATION			LUMP SUM



PROFILE ALONG C OF CULVERT



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SHEET 1 OF 5

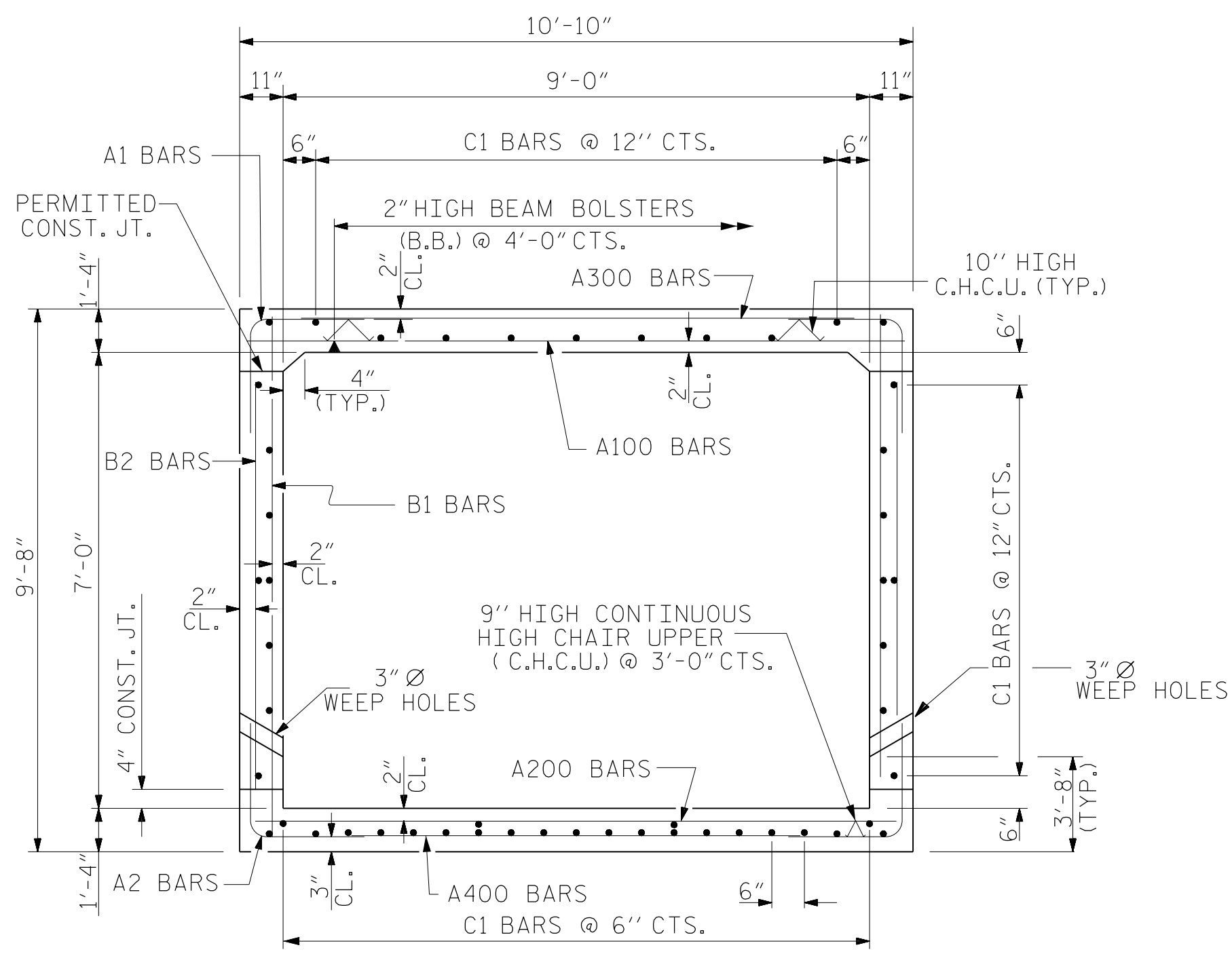
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

**SINGLE 9 FT. X 7 FT.
 CONCRETE BOX CULVERT
 66° SKEW**

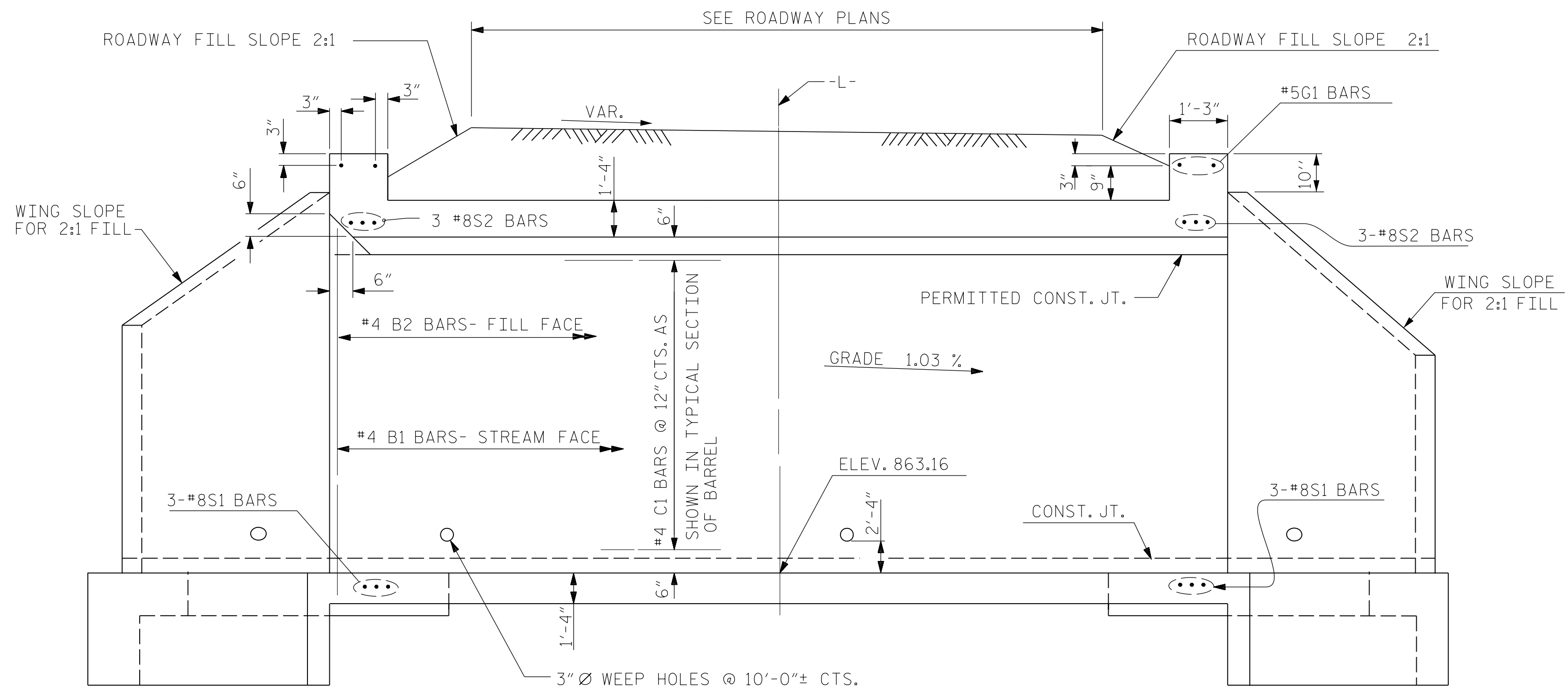
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NO.	BY:	DATE:	NO.	BY:	DATE:	C13-01
1			3			TOTAL SHEETS
2			4			5

DRAWN BY: H. ASSFOURA DATE: 11/16
 CHECKED BY: D. RUGGLES DATE: 12/16
 DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 12/16

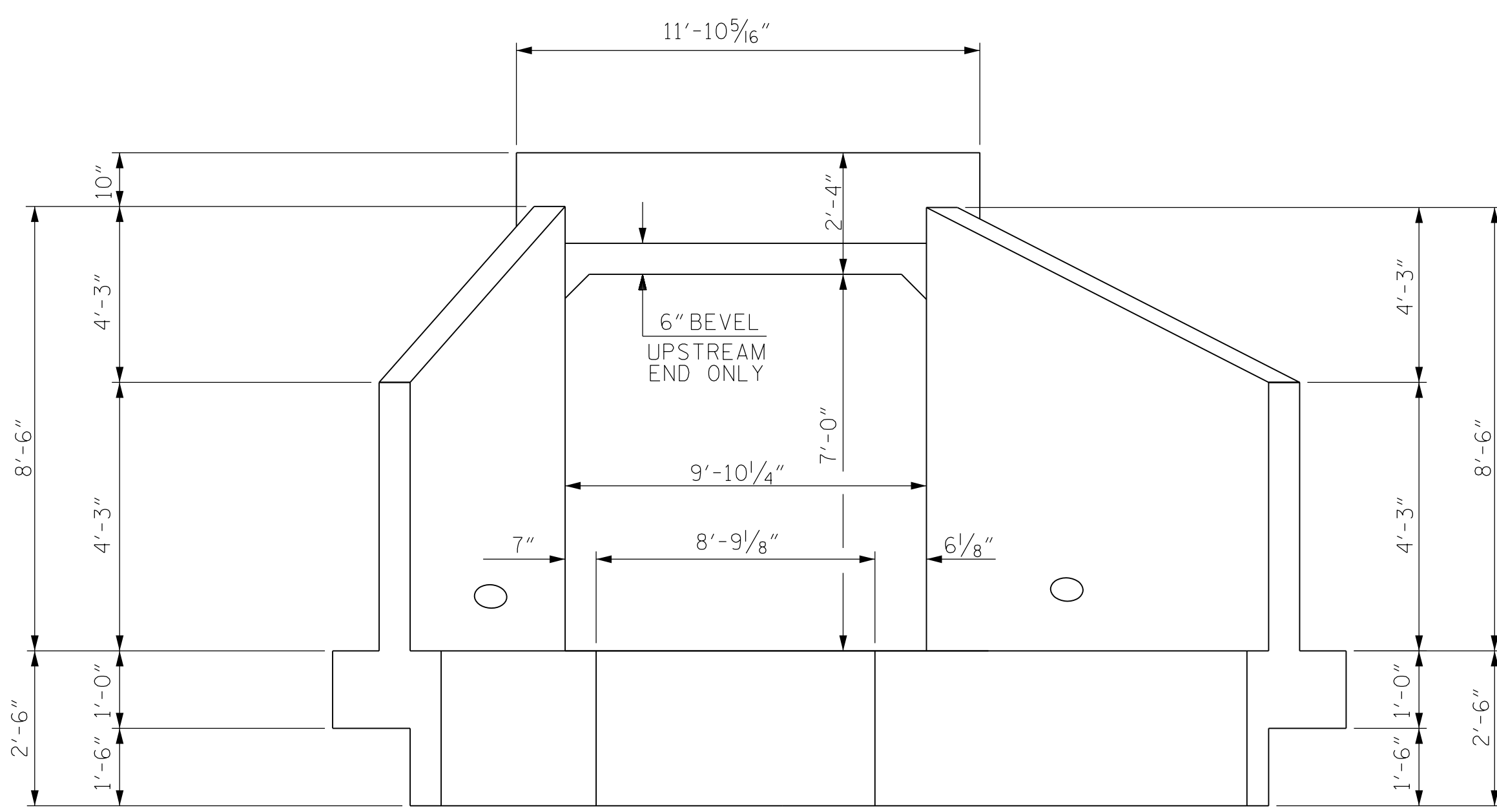
R 2707C-SITE 3
 2/10/2017
 \\413-001-R2707C-SMU-LS01-C13-1.dgn
 USER: d.ruggles



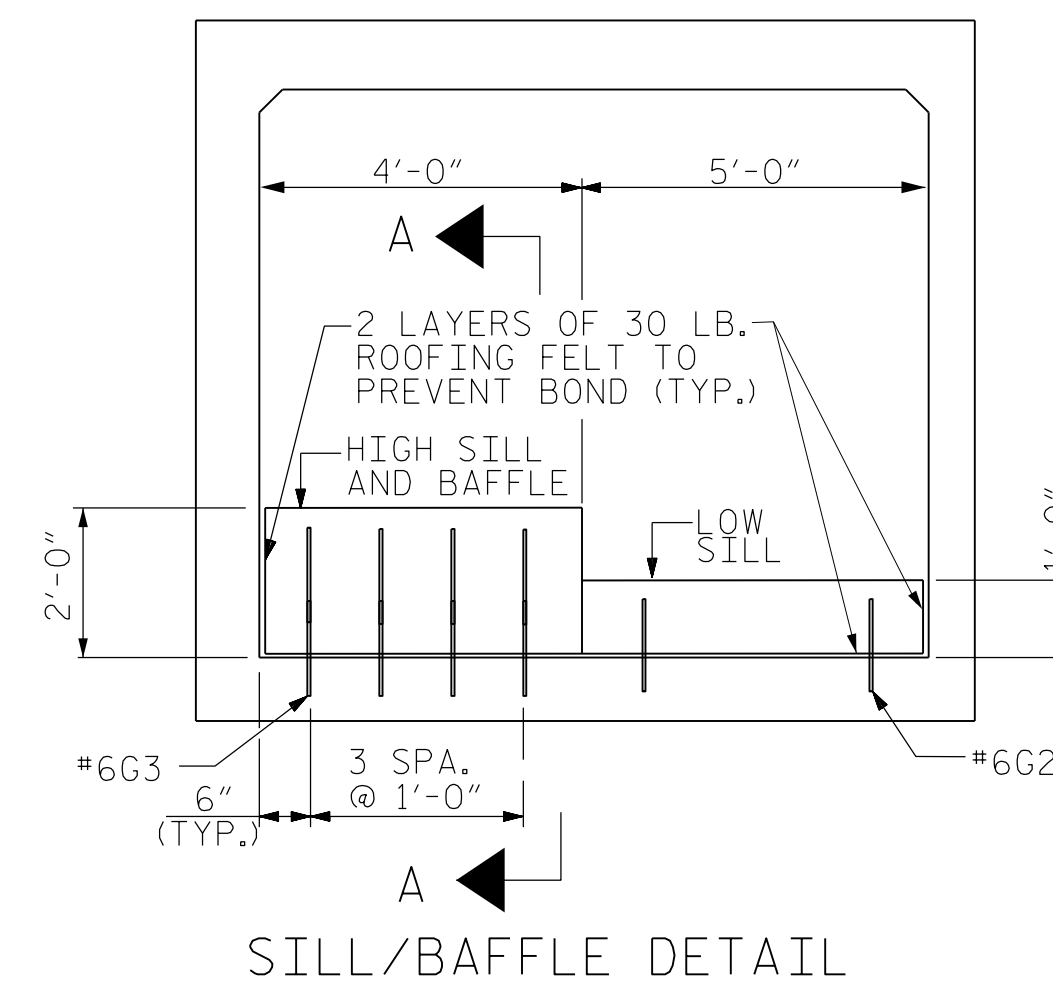
RIGHT ANGLE SECTION OF BARREL
THERE ARE 50 "C" BARS IN SECTION OF BARREL



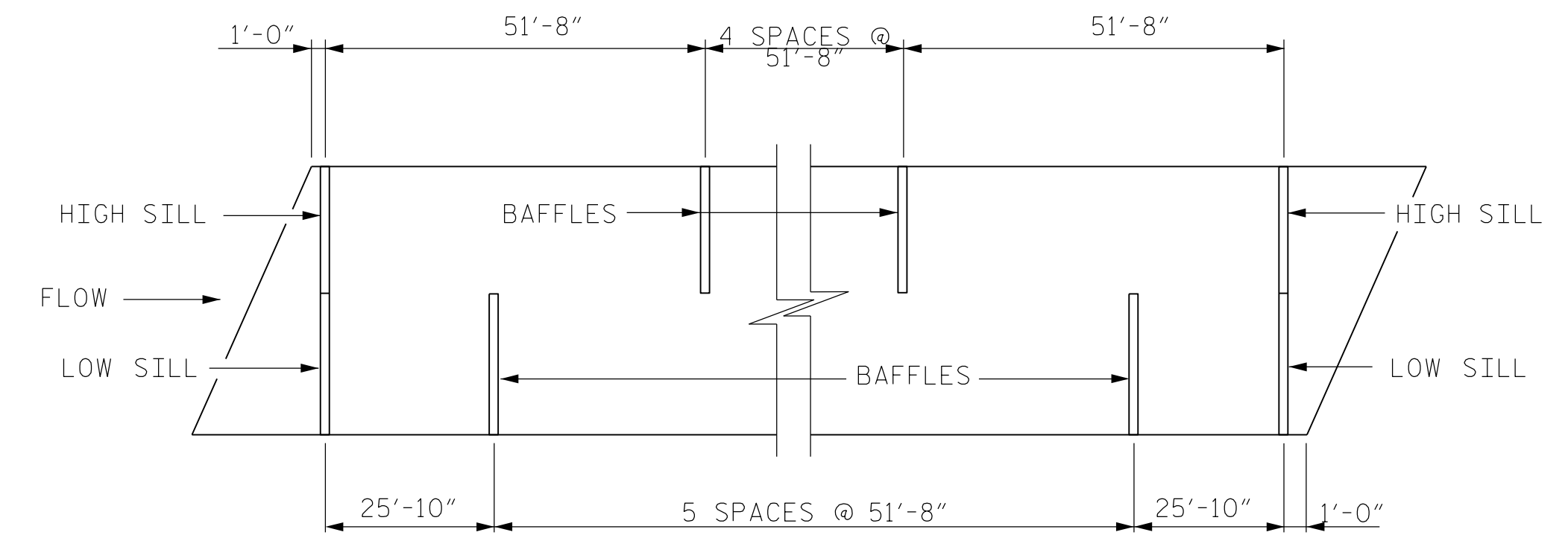
CULVERT SECTION NORMAL TO ROADWAY



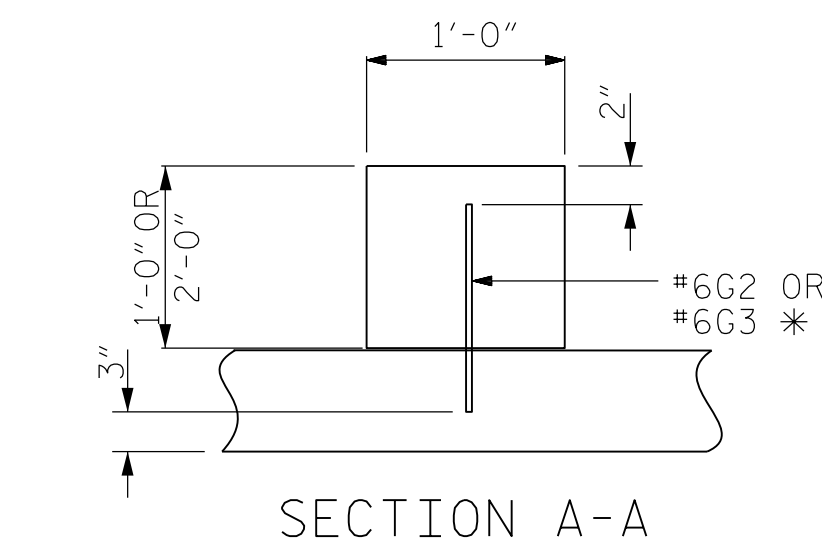
END ELEVATION NORMAL TO SKEW



SILL/BAFFLE DETAIL

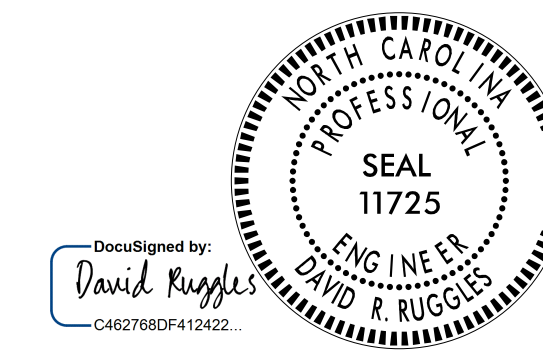


SILL LAYOUT



SECTION A-A

* DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED



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SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9 FT. X 7 FT.
CONCRETE BOX CULVERT
66° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C13-02
1			3			TOTAL SHEETS
2			4			5

R 2707C-SITE 3

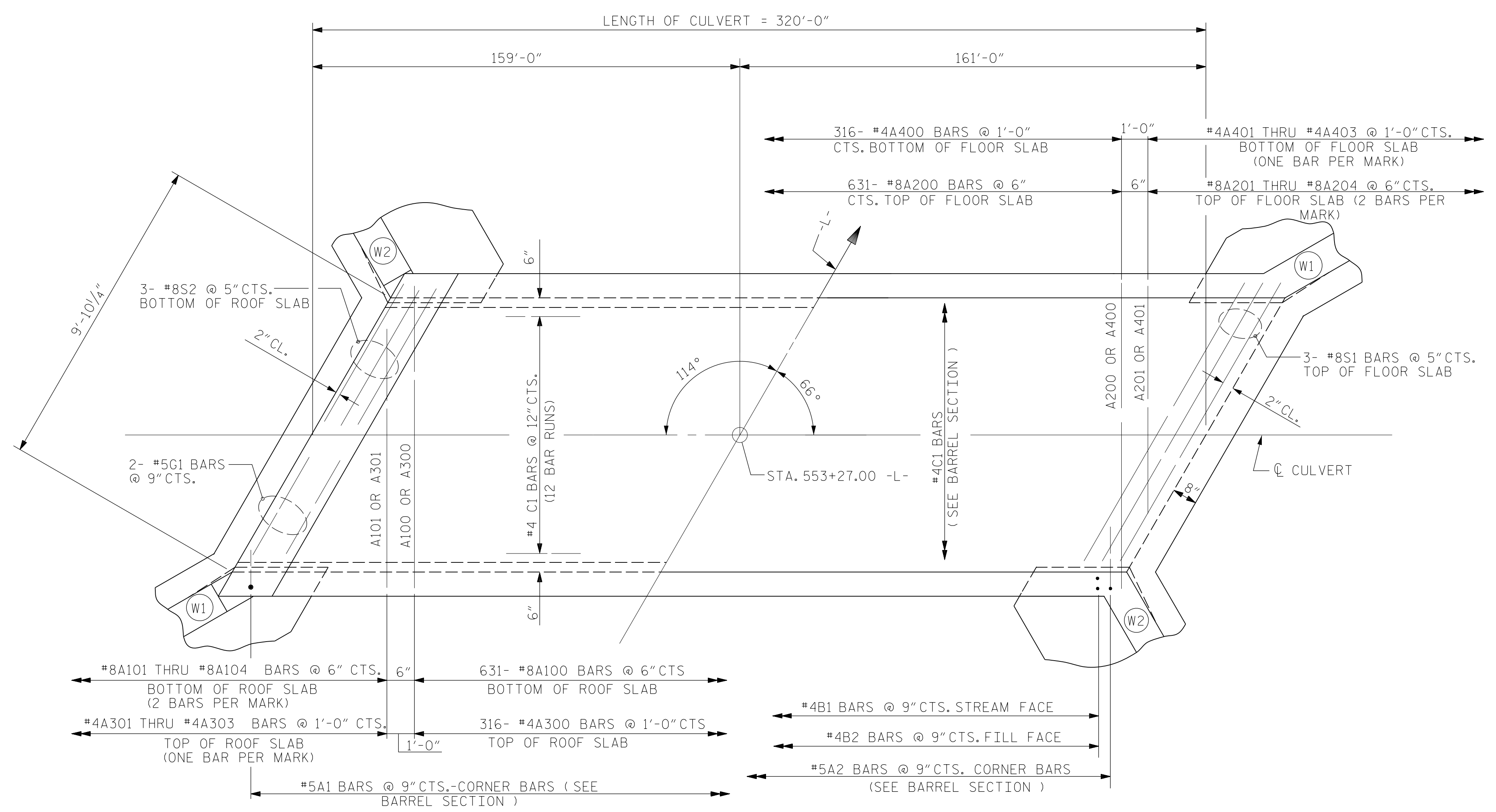
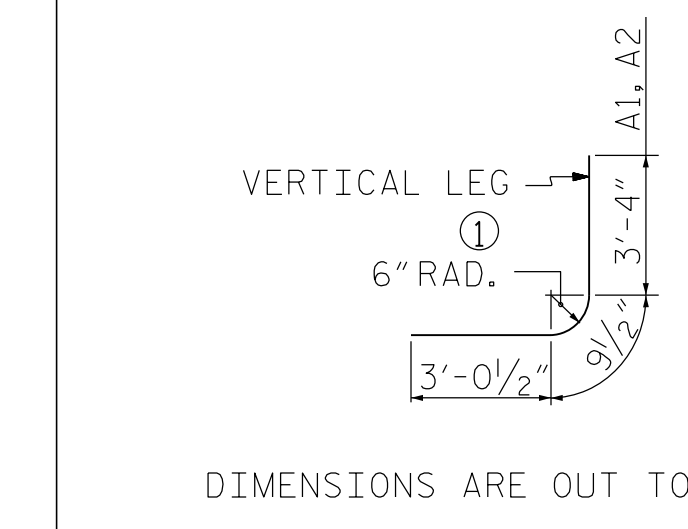
2/10/2017

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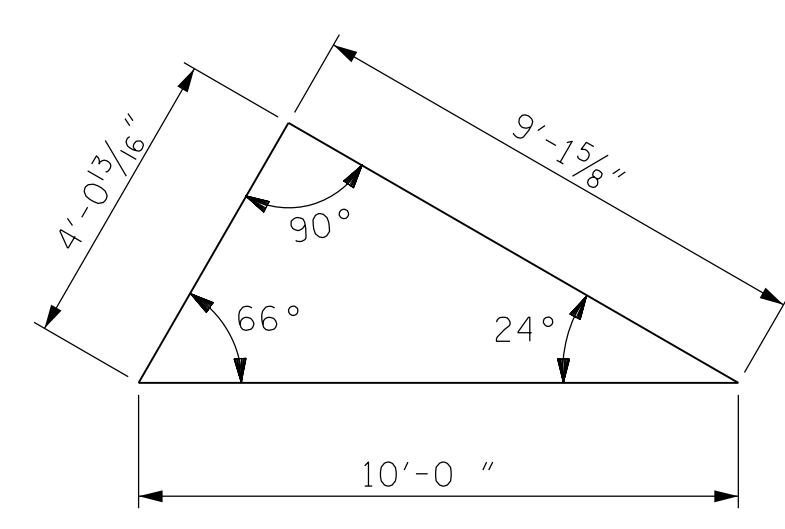
DRAWN BY: HASSFOURA DATE: 11/16
CHECKED BY: D. RUGGLES DATE: 12/16
DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 12/16

BAR TYPE		BILL OF MATERIAL				
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
A1	1708	#5	1	7'-2"	12767	
A2	1708	#5	1	7'-2"	12767	
A100	631	#8	STR.	10'-5"	17550	
A101	4	#8	STR.	8'-2"	87	
A102	4	#8	STR.	5'-11"	63	
A103	4	#8	STR.	3'-8"	39	
A104	4	#8	STR.	1'-5"	15	
A200	631	#8	STR.	10'-5"	17550	
A201	4	#8	STR.	8'-2"	87	
A202	4	#8	STR.	5'-11"	63	
A203	4	#8	STR.	3'-8"	39	
A204	4	#8	STR.	1'-5"	15	
A300	316	#4	STR.	10'-5"	2199	
A301	2	#4	STR.	8'-2"	11	
A302	2	#4	STR.	5'-10"	8	
A303	2	#4	STR.	3'-7"	5	
A400	316	#4	STR.	10'-5"	2199	
A401	2	#4	STR.	8'-2"	11	
A402	2	#4	STR.	5'-10"	8	
A403	2	#4	STR.	3'-7"	5	
B1	854	#4	STR.	9'-1"	5182	
B2	854	#4	STR.	6'-0"	3423	
C1	600	#4	STR.	28'-4"	11356	
S1	6	#8	STR.	11'-6"	185	
S2	6	#8	STR.	11'-6"	185	
G1	4	#5	STR.	11'-6"	48	
G2	4	#6	STR.	1'-11"	12	
G3	52	#6	STR.	2'-11"	228	
REINFORCING STEEL					86,107 LBS	

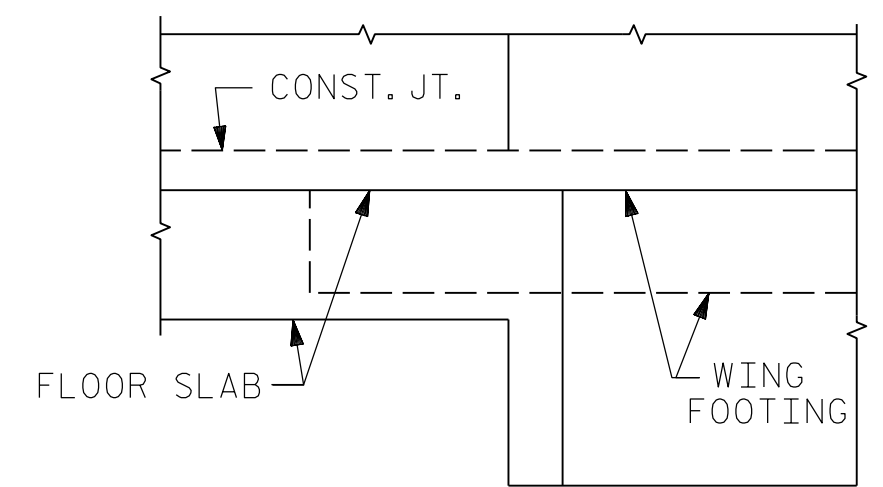
SPLICE CHART		
BAR	SIZE	SPLICE LENGTH
B1	#4	1'-9"
C1	#4	1'-11"



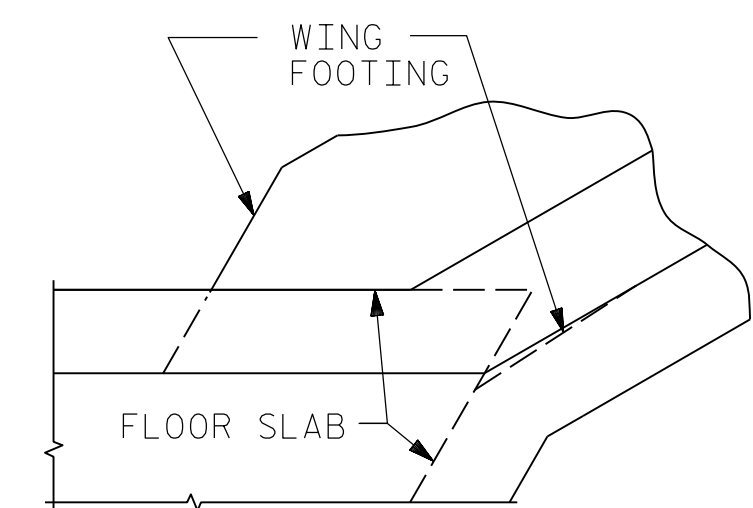
PART PLAN - ROOF SLAB PART PLAN - FLOOR SLAB



SKREW TRIANGLE



DETAIL



CONNECTION OF WING FOOTING AND FLOOR SLAB WHEN SLAB IS THICKER THAN FOOTING

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 SHEET 3 OF 5



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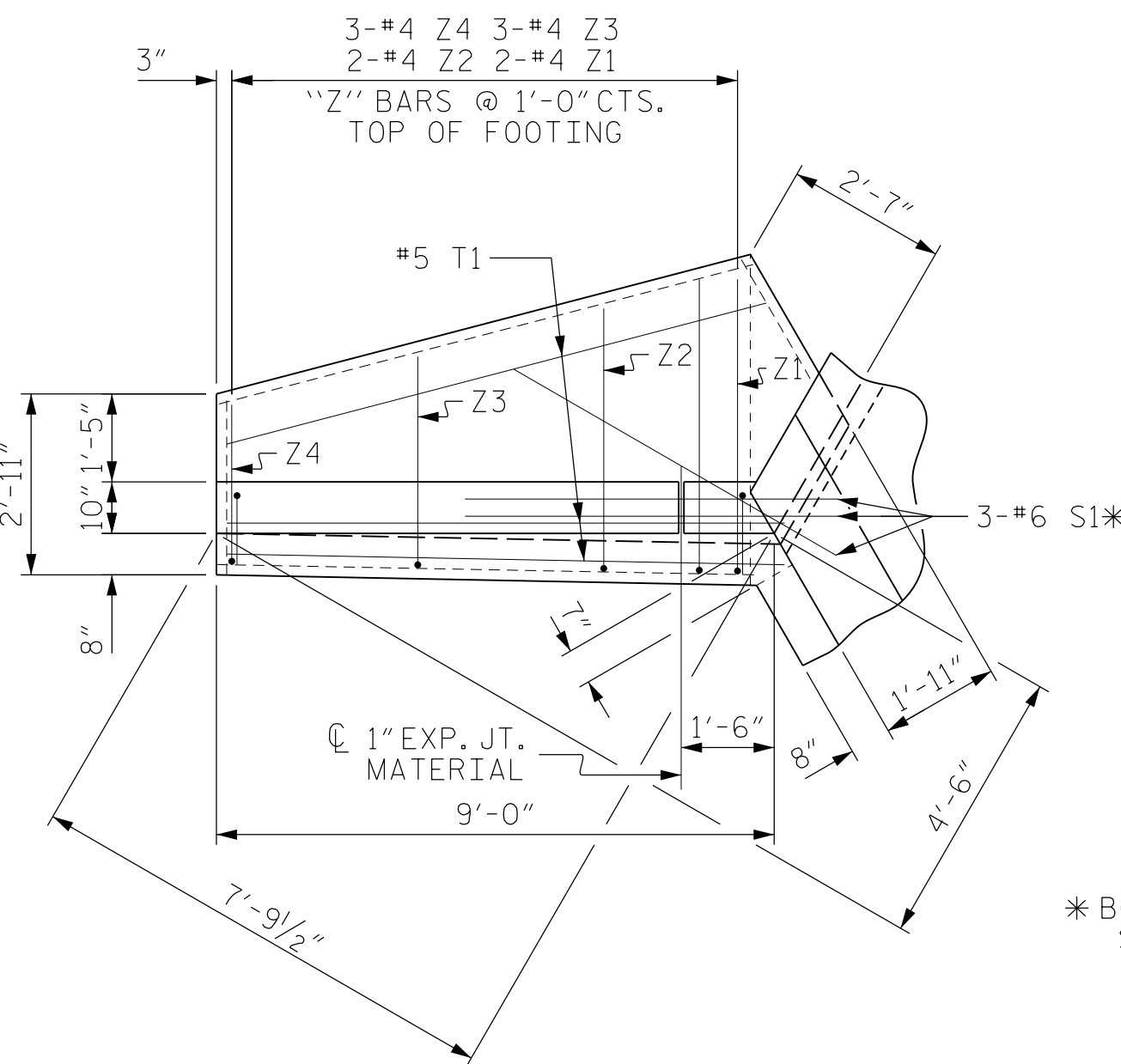


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
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 SINGLE 9 FT. X 7 FT.
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 66° SKEW

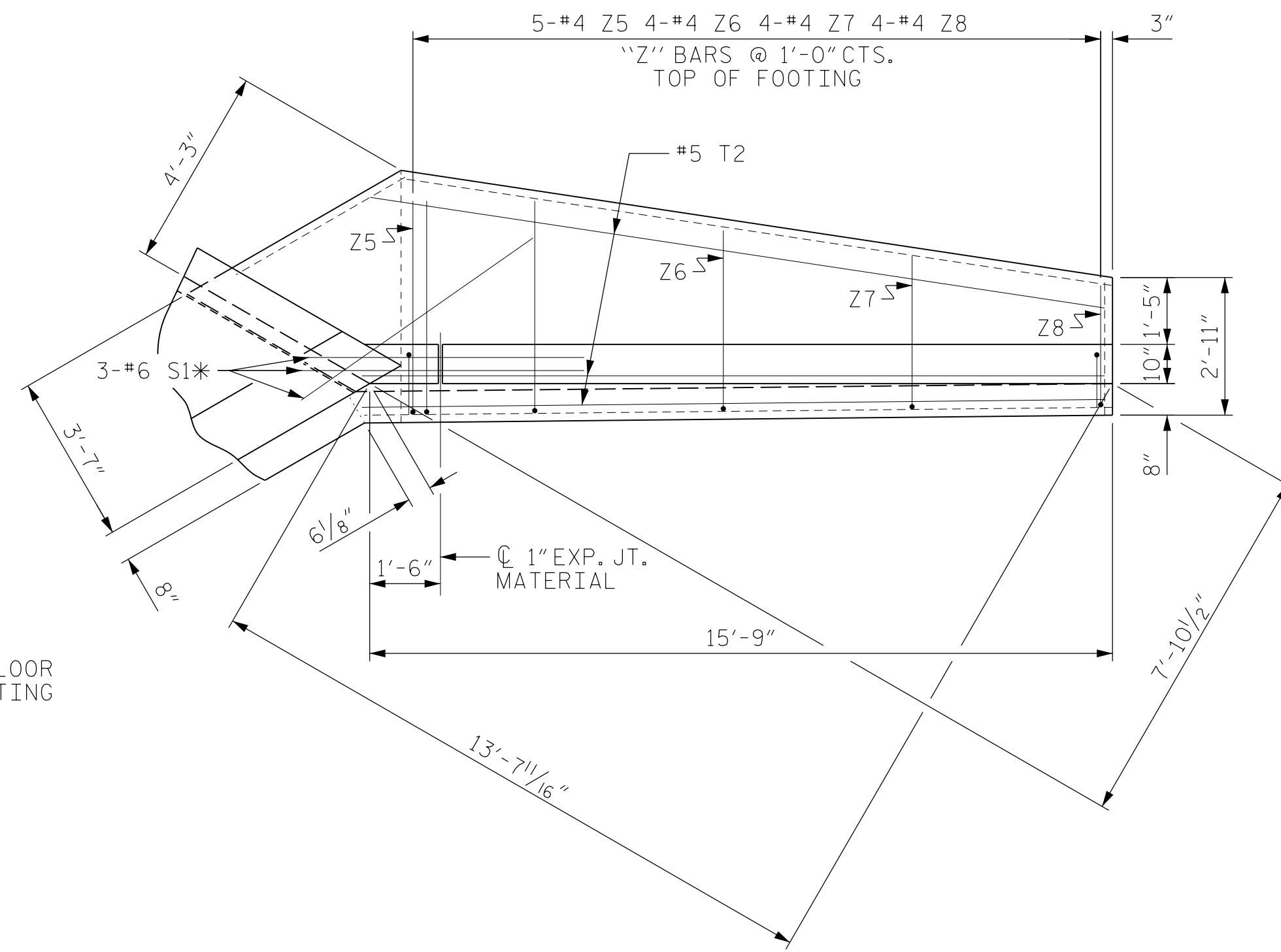
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NO.	BY:	DATE:	NO.	BY:	DATE:	C13-03
1			3			TOTAL SHEETS
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 DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 12/16

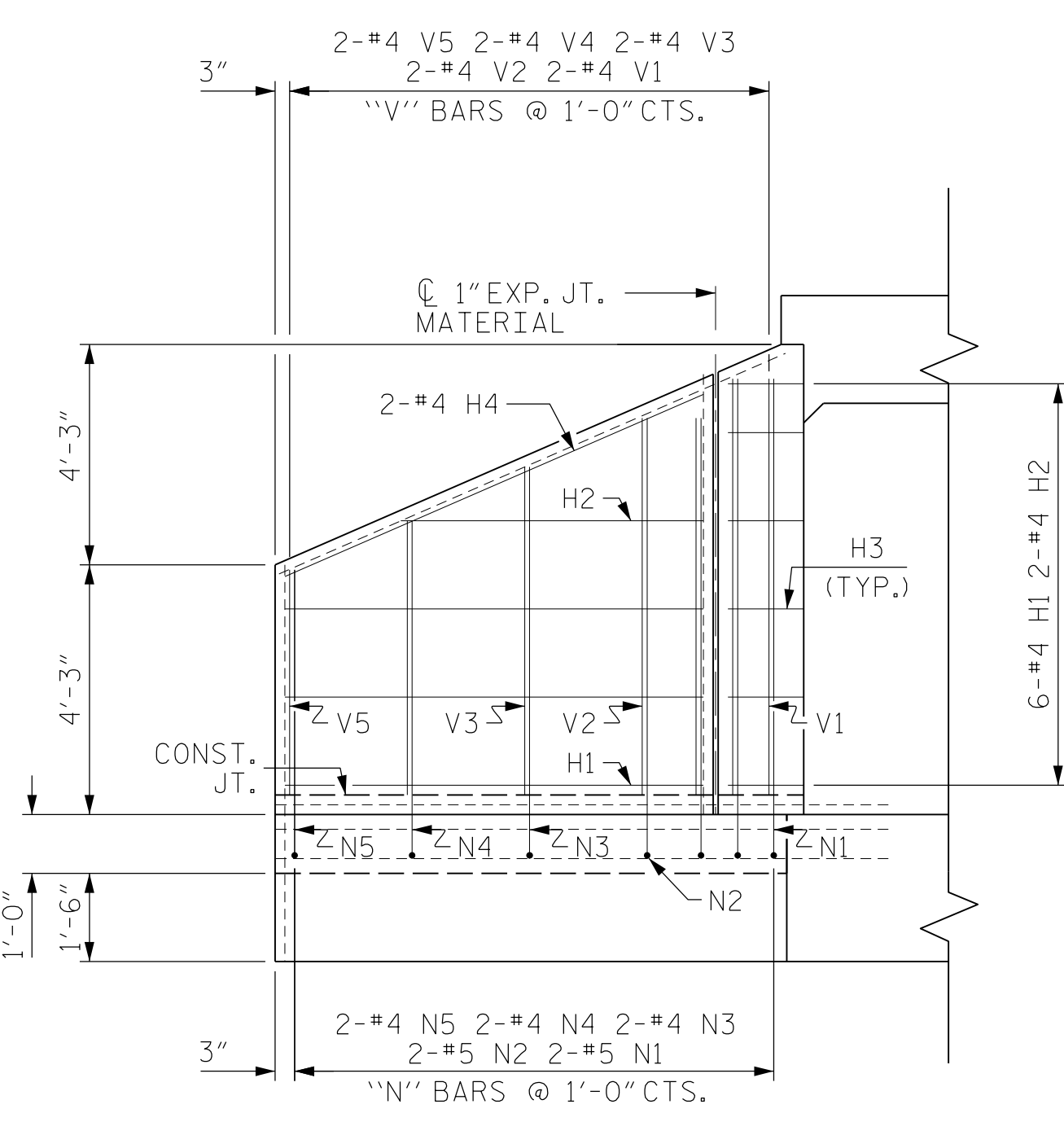
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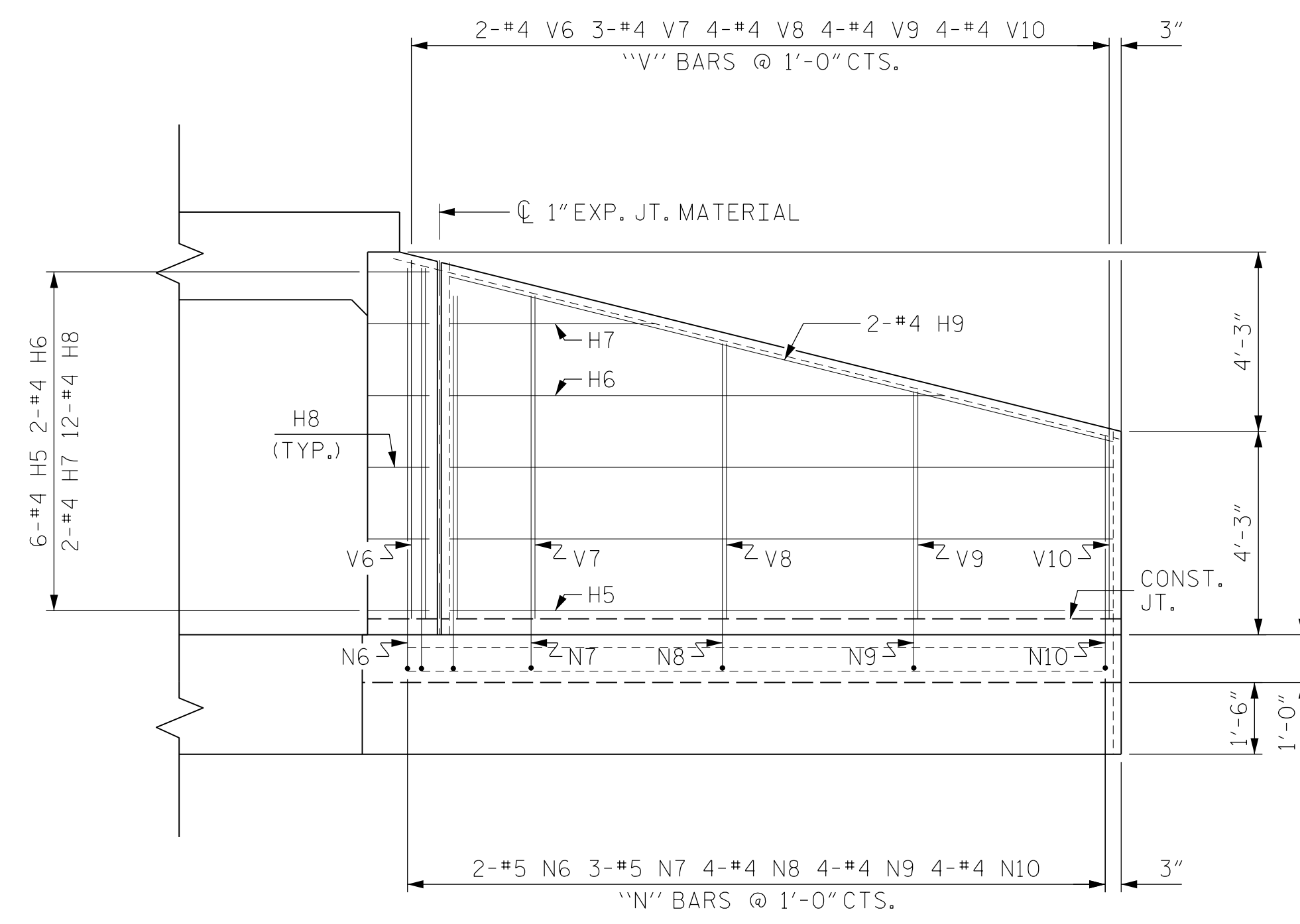
PLAN W2



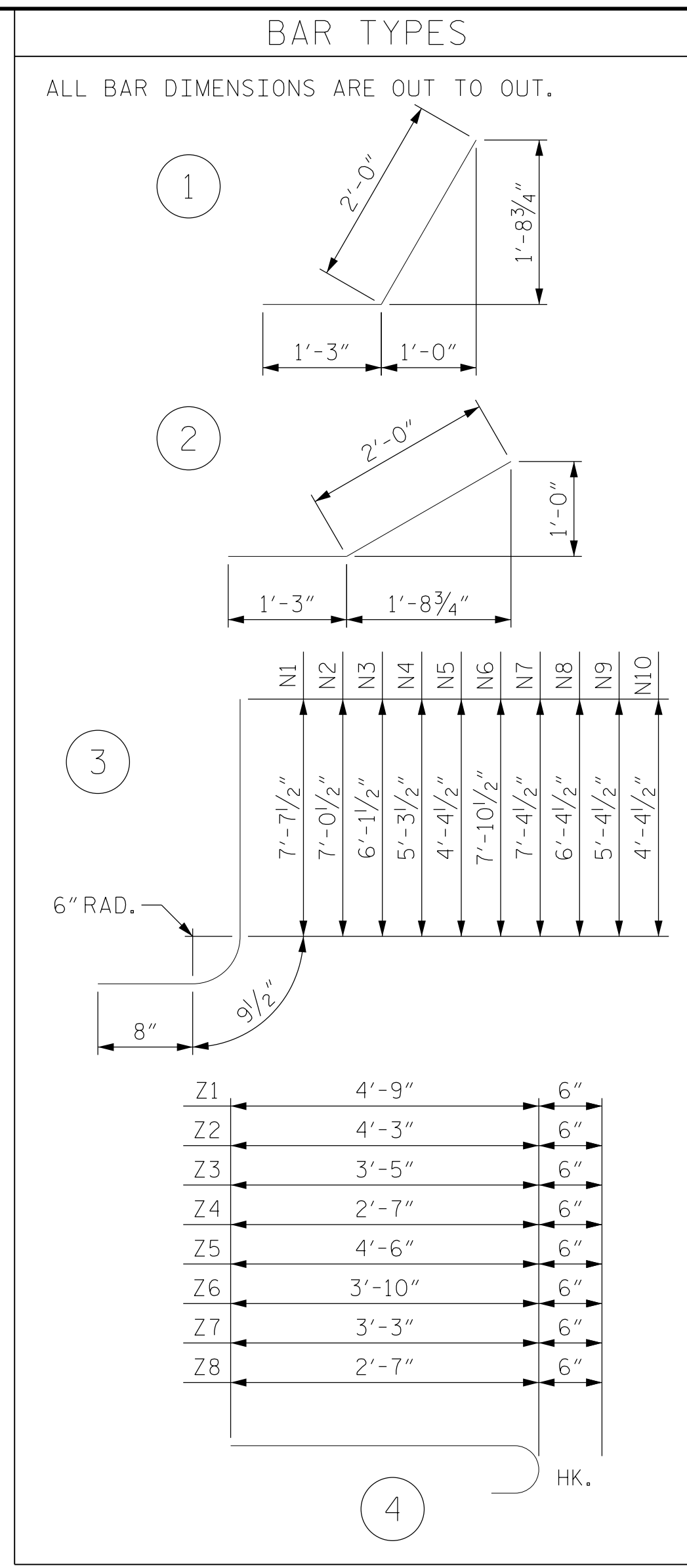
PLAN W1



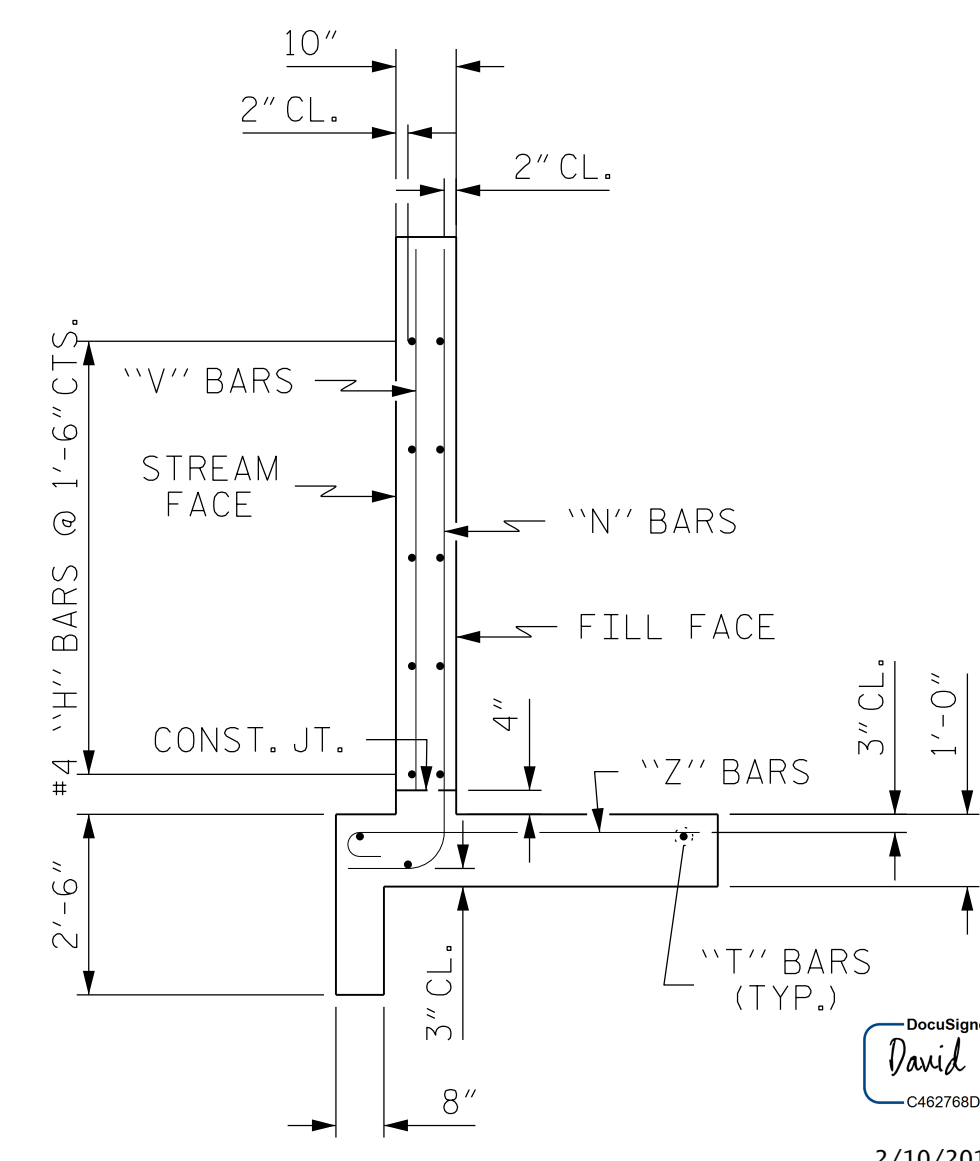
ELEVATION W2



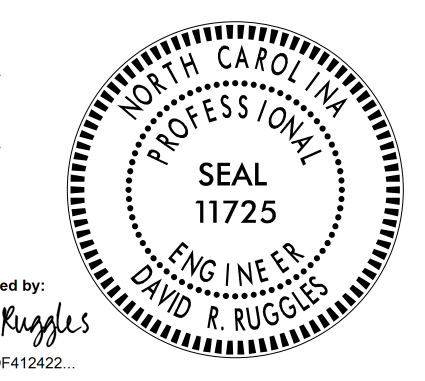
ELEVATION W1



BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	7'-1"	57
H2	4	#4	STR	5'-2"	14
H3	24	#4	1	3'-3"	52
H4	4	#4	STR	7'-9"	21
H5	12	#4	STR	13'-10"	111
H6	4	#4	STR	10'-4"	28
H7	4	#4	STR	4'-3"	11
H8	24	#4	2	3'-3"	52
H9	4	#4	STR	14'-3"	38
N1	4	#5	3	9'-1"	38
N2	4	#5	3	8'-6"	35
N3	4	#4	3	7'-7"	20
N4	4	#4	3	6'-9"	18
N5	4	#4	3	5'-10"	16
N6	4	#5	3	9'-4"	39
N7	6	#5	3	8'-10"	55
N8	8	#4	3	7'-10"	42
N9	8	#4	3	6'-10"	37
N10	8	#4	3	5'-10"	31
S1	12	#6	STR	6'-0"	108
T1	6	#5	STR	9'-0"	56
T2	6	#5	STR	15'-9"	99
V1	4	#4	STR	7'-1"	19
V2	4	#4	STR	6'-5"	17
V3	4	#4	STR	5'-7"	15
V4	4	#4	STR	4'-8"	12
V5	4	#4	STR	3'-10"	10
V6	4	#4	STR	7'-4"	20
V7	6	#4	STR	6'-9"	27
V8	8	#4	STR	5'-9"	31
V9	8	#4	STR	4'-9"	25
V10	8	#4	STR	3'-10"	20
Z1	4	#4	4	5'-3"	14
Z2	4	#4	4	4'-9"	13
Z3	6	#4	4	3'-11"	16
Z4	6	#4	4	3'-1"	12
Z5	10	#4	4	5'-0"	33
Z6	8	#4	4	4'-4"	23
Z7	8	#4	4	3'-9"	20
Z8	8	#4	4	3'-1"	16
REINFORCING STEEL FOR 4 WINGS					1321 LBS
CLASS A CONCRETE					
4 WINGS					19.8 CY
2 HEADWALLS					1.1 CY
2 END CURTAIN WALLS					2.6 CY
SILLS					4.7 CY
TOTAL					28.2 CY



TYPICAL WING SECTION



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SHEET 4 OF 5

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD WINGS
 FOR
 CONCRETE BOX CULVERT
 H = 7'-0" SLOPE = 2:1
 60° SKEW

REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO.
 C13-04
 TOTAL SHEETS
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 CHECKED BY: D.RUGGLES DATE: 12/16
 DESIGN ENGINEER OF RECORD: D.RUGGLES DATE: 12/16

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 USER:deFault

LOAD AND RESISTANCE FACTOR RATING (LRFR)
SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER	
						LIVE-LOAD FACTORS (LL)	MOMENT				SHEAR				
							RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE		DISTANCE FROM LEFT END OF ELEMENT (ft)
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A		N/A	N/A	1.75	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	
	HL-93 (OPERATING)	N/A		N/A	N/A	1.35	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	
	HS-20 (INVENTORY)	36.000		N/A	N/A	1.75	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	
	HS-20 (OPERATING)	36.000		N/A	N/A	1.35	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	1	
		SNGARBS2	20.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	1	
		SNAGRIS2	22.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	1	
		SNCOTTS3	27.250		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	1	
		SNAGGRS4	34.925		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	1	
		SNS5A	35.550		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	1	
		SNS6A	39.950		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	1	
		SNS7B	42.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	1	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	1	
		TNT4A	33.075		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	1	
		TNT6A	41.600		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	1	
		TNT7A	42.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	1	
		TNT7B	42.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	1	
		TNAGRIT4	43.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	1	
TNAGT5A	45.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	1			
TNAGT5B	45.000		N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1		
PERMANENT LOADS		N/A	4	1.01	N/A	N/A	1.22	1	EXT. WALL	0.7	1.01	1	BOTTOM SLAB	1.5	2

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

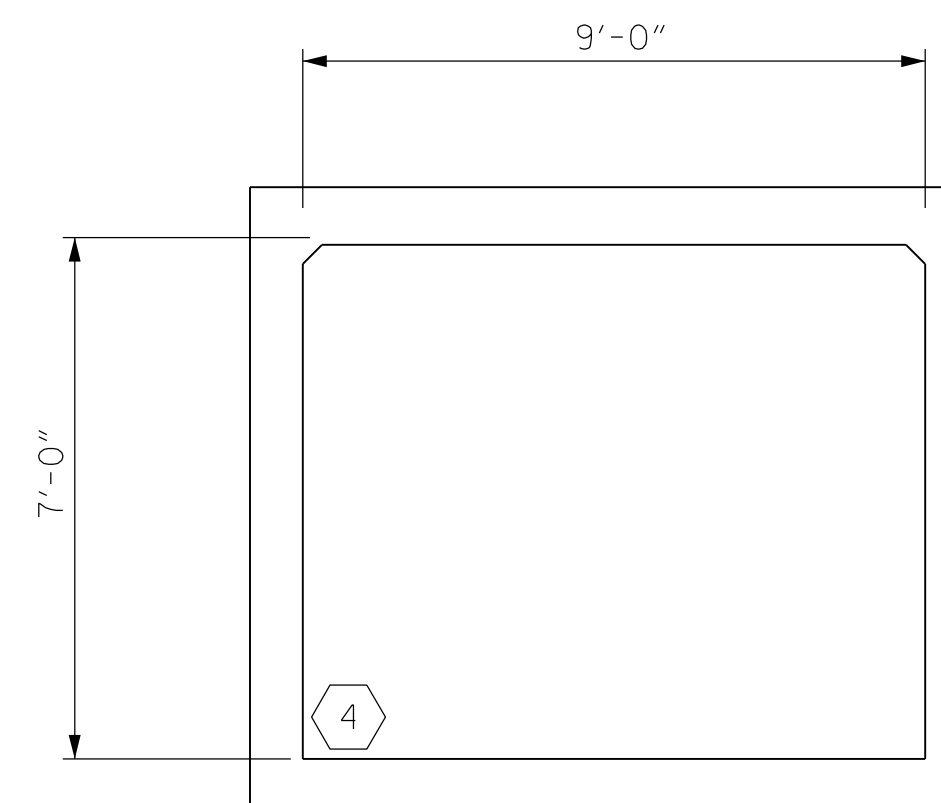
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

- EFFECTS OF LIVE LOAD MAY BE NEGLECTED ACCORDING TO AASHTO LRFD 3.6.1.2.6 (DESIGN FILL=42.0')
- CULVERTS WITH DEEP FILL SHOULD BE EVALUATED FOR THE EFFECTS OF PERMANENT LOADS ONLY ACCORDING TO "THE MANUAL FOR BRIDGE EVALUATION 6A.5.2.3A"

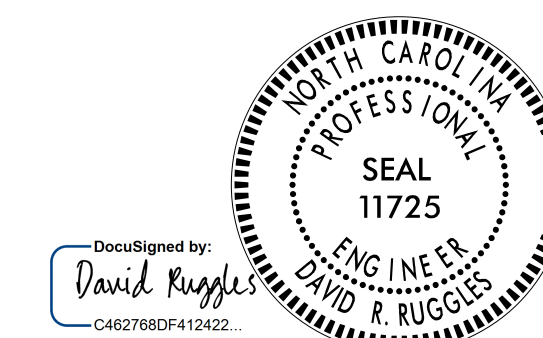
#	CONTROLLING LOAD RATING
1	DESIGN LOAD RATING (HL-93)
2	DESIGN LOAD RATING (HS-20)
3	LEGAL LOAD RATING **
4	PERMANENT LOAD RATING
** SEE CHART FOR VEHICLE TYPE	



LRFR SUMMARY
(LOOKING DOWNSTREAM)

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 553+27.00 -L-

SHEET 5 OF 5



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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9 FT. X 7 FT.
CONCRETE BOX CULVERT
66° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C13-05
1			3			TOTAL SHEETS
2			4			5

DRAWN BY: H.ASSFORA	DATE: 11/16
CHECKED BY: D.RUGGLES	DATE: 12/16
DESIGN ENGINEER OF RECORD: D.RUGGLES	DATE: 12/16

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USER:deFault